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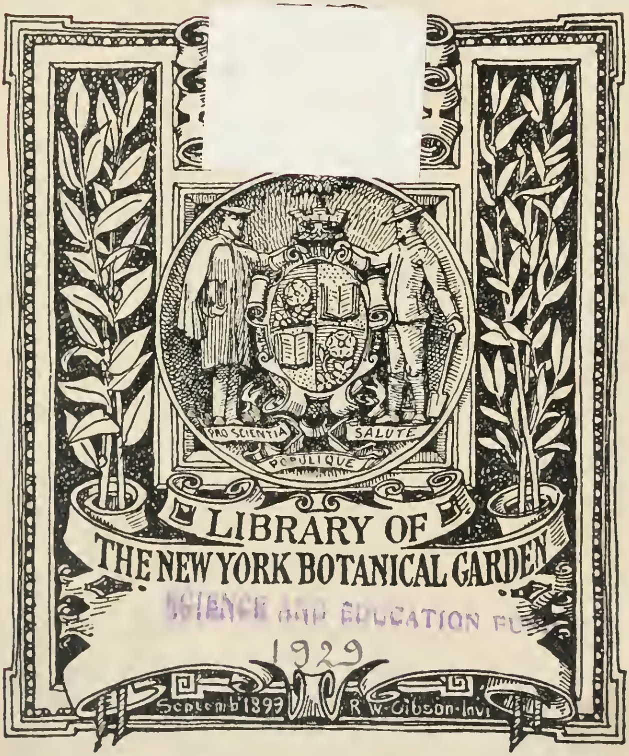

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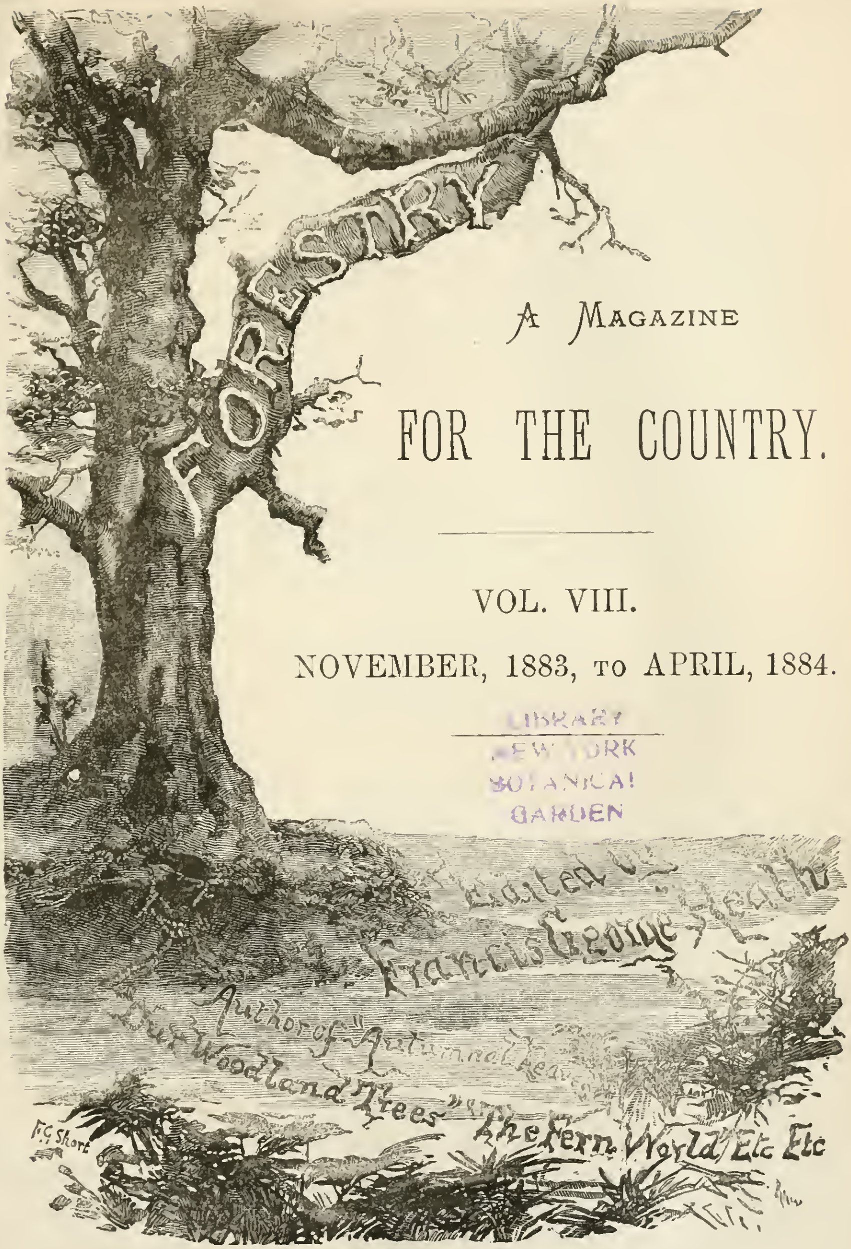
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Edited by
Francis George Heath
Author of "Autumnal Leaves"
"Our Woodland Trees" "The Fern World" Etc Etc
F.G. Short

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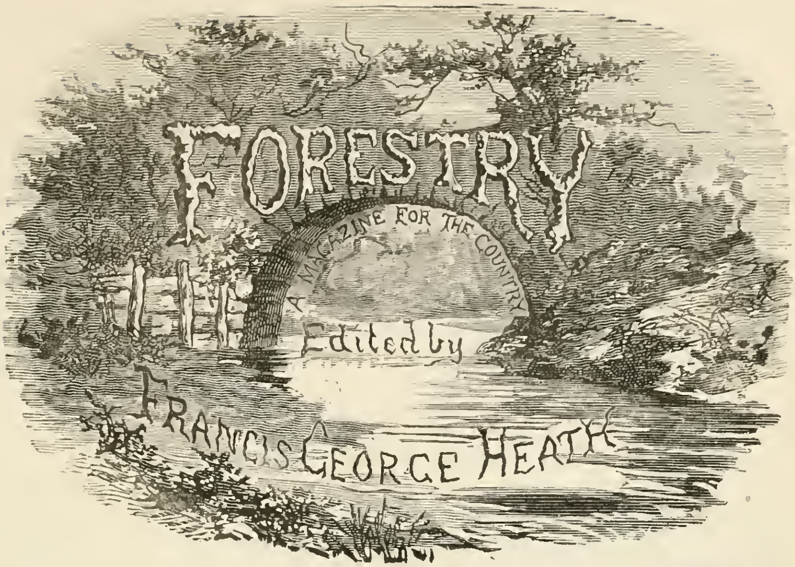

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WE deeply regret to announce the death of one whose name figured prominently in our pages during our recent discussion of the important question of forest destruction in America. In forestry circles Mr. James Little's name was widely known, and his loss will be widely deplored. We give, elsewhere, an extract from a Canadian contemporary that will serve to show the estimation in which Mr. Little was held in America. Forestry can ill afford to lose such men. In the case of Mr. James Little, however, the cause of American forestry has an admirable defender in the person of his son, whose interesting articles on the subject of the destruction of American forests attracted so much attention in recent numbers of 'FORESTRY.' Mr. William Little has already taken up the work in which his father was so long engaged, and we trust that ere long his labours will produce the desired impression upon the American and Canadian governments and upon the transatlantic public.

⁂

THE Annual General Meeting of the Scottish Arboricultural Society has passed off again, with considerably more than the accustomed amount of success. Occurring at a time when the public mind is full of anticipations of the Great International Forestry Exhibition, it attracted more attention to its proceedings, than any previous meeting of the Society could have done. And after a study of the details of the business done—a full report of which we give in our present issue—we believe that most readers will agree with us when we say that the Society is doing excellent work in advancing the interests of forestry, and bids fair to command success in the noble efforts it is making to raise the science and art of forestry in this country to the educated level which it has attained in every other civilised state.

⁂

The best test of the success and usefulness of any Society is the desire of those whom it specially concerns to join its ranks; and looking at it from this purely practical point of view, the Scottish Arboricultural Society has had an unusual amount of success in recent times. Under the patronage of Her Most Gracious Majesty the Queen, it has gained a large accession to its members from amongst the nobility and landowners of the country, who form the mainstay of most institutions of the kind; whilst at the same time it has been equally attractive to the foresters, land-agents, timber-merchants, and to those members of the general public who take an interest in the promotion of science and arts beneficial to their fellow-men.

⁂

The excellent address delivered by the President, the distinguished ex-Indian forester and veteran arborist Dr. Cleghorn, gives an interesting *précis* of the career of the Society and of its progress, step by step, from its small beginning a generation ago to its full maturity at the present day. To the few who have been members throughout the review must be extremely pleasing, as well as to those who can only claim a few years' acquaintance with it. The past and the future prospects of the Society are alike satisfactory and encouraging. Under the able presidency of Dr. Cleghorn, we expect the ensuing year will be one of marked progress in the affairs of the Society, and the beginning of an era when it will distinguish itself as greatly in the science as it has already done in the technics of forestry.

⁂

For some time a feeling has prevailed that the useful Excursions which the Society has made once or twice a year to the woods and plantations of several districts in Scotland, were not so productive of practical results as the majority who joined in them could wish. It was therefore a wise decision of the Council to set this subject down for discussion at the past meeting, so as to elicit a free expression of the views of the members. Although we are not prepared to endorse everything that was said, the matter was discussed with much good sense, and with an evident desire on the part of the speakers to promote the best interests of the Society as well as to encourage good feeling amongst the members, and where such a desirable spirit prevails, much good is certain to be the result. The Council have now the responsibility of carrying out the proposals made, and whatever course may be taken, we hope it will be taken with a view to make these Excursions as useful and complete and as popular as possible.

⁂

To join in such a pleasant and interesting excursion as that to Bowhill, so graphically described by our special correspondent in our present issue, is an event to be marked by a red letter in the life of any lover of trees and beautiful scenery. A day spent in inspecting such a charmingly wooded country, and such a beautifully laid-out and well-managed estate, is worth any amount of trouble in economizing time and means to accomplish it. Whether it was to admire the lovely landscape, the fine trees with which it is adorned, and the excellent order in which all appears to be kept by the noble owner, or to muse on the stirring events of which the district was the scene in former days, a profitable day must have been enjoyed, and the visit to 'Yarrow's Braes and Ettrick Shaws' will long be recalled by all as a memorable one.

⁂

THE most interesting feature of the Excursion was evidently the visit paid to the 'Hained Ground'—a large area which the Duke of Buccleuch has for many years left to Nature to re-clothe with leafy woods and stately trees. The only care which apparently has been bestowed on the enclosure is to keep sheep and other stock, which have the run of the adjacent hills, out of it. The result appears to be almost everything that can be desired, and the 'Hained Ground' must be quite a paradise to a botanist, although it has so far refused to produce Oaks without the aid of man. From this admirable example of 'forest conservancy' an excellent lesson may be derived by those interested in the regeneration by natural reproduction of forests. By thoroughly protecting any piece of land from the inroads of browsing animals, it will in course of time become covered with 'forest' vegetation, but few will venture to say that where a *paying* crop of trees is wanted this 'natural process' is the most remunerative. When only landscape effect is desired, then Nature may have full sway with the best results.

⁂

THE International Forestry Exhibition at Edinburgh is now rapidly getting into shape, and is receiving most substantial support both at home and abroad. The inquiries for space already bid fair to take up the whole of the proposed area long before the appointed time, and we would urge our readers in every part of the world to send in their applications for the space they require at the earliest possible opportunity. In doing so they will be certain to receive every consideration at the hands of the Executive, and room will be provided for everybody to the utmost limit of the ground at the Committee's disposal. Our readers, and other intending exhibitors, may obtain any information on the subject of the Exhibition which they may require by applying at the office of this Magazine, to Mr. W. H. Rider, who has been appointed the London agent for the Committee.

⁂

We hear that there is a good prospect of securing a highly eligible site for the Exhibition in Princes Street Gardens, which will do credit alike to the progressive enterprise and public spirit of the citizens of Edinburgh, and to the richest forest products of the world. With the many advantages of such an admirable site, the whole civilized world will freely contribute towards making the Exhibition a complete success. From every quarter of the globe hosts of visitors will flock to Edinburgh in 1884, and it falls to those responsible for the honour and prosperity of the Modern Athens to see that the very best is done—pleasantly, profitably, and instructively. And the Committee, on their part, must strain every nerve, as we are convinced they will do, to make the exhibition creditable to the beautiful city in which it is held, as well as to forestry, and to the whole nation.

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At a meeting of the Executive Council held in Edinburgh on the 24th ult., communications were received from the Secretaries of State for Foreign Affairs, the Colonies, and India, intimating their approval of the Exhibition, and proffering their aid in their respective departments towards carrying out the object in view. Letters were read from the Department of Science and Art warmly commending the project to the public as one likely to advance the spread of a knowledge of scientific forestry, at present so little practised in this country, though it is of such immense importance to the Empire. Among others were also several important communications from foreign States and their representatives, inquiring about the facilities for exhibiting their forest products, and other matters of a preliminary nature,—all of which augurs well for the complete success of the Exhibition.

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Seldom in the history of the Society has such a numerous and important addition been made to its membership as at the past meeting, when upwards of sixty members were enrolled, including such distinguished names as the Duke of Argyle, the Duke of Athole, Lord

Stormont, Sir Henry Loch, Sir Arnold Kemball, and others, all directly interested—and to a very large extent—in the prosperity of the woods and forests, and forestry of Britain. Nothing can better indicate the rapidly growing interest that is being taken in the subject of forestry, and the application of its principles to the wants of the country, than is thus shown by those who are most deeply interested taking an active part in spreading a correct knowledge of forestry among the people.

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THE essays and exhibits at the meeting also show a marked increase, and in this department of the Society's work much more may yet be done if members would take up the matter in earnest, and, each in his own way, contribute *something* every season. Either an essay or report on some special subject in which the author takes an interest, and upon which he can give some useful information; or some article of a useful or ornamental nature for exhibition at the meeting, is quite within the power of a large number of the members, and would add immensely to the attractions of the meetings.

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WE have received from the India Office 'A Collection of Papers on Bee-keeping in India.' It is published under the orders of the Government of India in the revenue and agricultural department, and consists, in substance, of a number of interesting reports by forest and district officers, and other persons who have paid attention to the subject of bee-culture. Much valuable information will be found in the volume, the text of which is accompanied by some illustrations. The results of the inquiries are summed up as follows:—'It is found first that several varieties of honey bees are found in every province of India where there is sufficient forest or jungle, and that the honey of some of the varieties is good and in considerable demand;' next, 'that efforts have been successfully made in the hills, by Europeans, to domesticate Indian bees, but that bee-culture is only practised by natives in the very rudest way.' In the third place it is said to be 'very doubtful whether the bee could be domesticated in the plains, owing to the dearth of flowers during the three or four months preceding the rains;' and in the fourth place it is added 'that in Southern India persons (Mr. Stormont, of Bombay, and others) have given up all attempts to domesticate the most common variety of bee found there, on account of its intractable nature.'

FOREST RAMBLES.

IN FINLAND.

GEOGRAPHERS have stated that, in proportion to the area of its territory, Finland comprises within its limits a larger extent of land covered with water than any other country in the world. A tour either in the north or south of the Grand Duchy inclines one to accept this statement without question, and to supplement it with an expression of opinion that such part of the country as is not covered with water may fairly be said to be covered with forest. Whether the traveller proceeds by steamers up the Gulf of Bothnia to Uleaborg or Tornea, or up the Gulf of Finland to Helsingfors or Wiborg, he skirts a coast-line clad with a dense growth of Pine and Fir far as the eye can reach. As is to be expected—bearing in mind the fierce gales which strike these northern shores during the long winter, when every seaport is sealed up by King Frost, and the vast area of the Gulf of Bothnia is covered with thick ice—the trees are small and stunted; but the stoutness of their growth leads one to look for grand forests in the interior of the country; and in this respect the traveller will not be disappointed. Those who desire to learn something of the extent and value of these forests should consult the interesting work on the timber resources of the Grand Duchy recently published by Dr. J. C. Brown, which deals with the subject in an exhaustive manner. The following notes must be taken as those of a traveller, not of a forester, and may perhaps help to lead others to explore a country which at present may be said to be virtually unknown to Englishmen.

The routes from England to Finland need not here be described: suffice it to say that I made my way thither viâ Hull, Gothenburg and Stockholm. From the Venice of the North several lines of steamers are available, some steering up the Gulf of Bothnia, others up the Gulf of Finland. My friend, R. C. H. D., and I chose the latter route, and leaving Stockholm at seven in the evening, and being favoured by a brilliant full moon, which allowed of our steamer threading her way all night long amongst the countless thousands of islands, crossed the Baltic and were alongside the wharf at Abo at midday. Getting under way again at eight in the evening we rounded the south-west points of Finland at early morning in a fresh gale, and at four in the afternoon were steaming up to Helsingfors past the forts of Sweaborg. Thence twelve hours by rail landed us in St. Petersburg. The country passed through is flat, so flat, indeed, that in places one can scan the entire horizon without discerning even a mound or hillock a dozen feet in height. Belts of Fir and Birch diversify what would otherwise be a monotonous expanse of rough moorland; but within the Russian frontier the soil improves, and we pass hundreds of acres of potatoes and red cabbage, and here and there large tracts of woodland, mainly composed of Poplar, Scotch Fir and Birch, amongst which tall Spruces display their exquisite symmetry of form and profusion of foliage. After a short stay in the capital, we returned to Wiborg, along the same line of railway, and thence took a river steamer up the first twenty miles or so of stream, which forms the southern stage of the Saima Canal. The scenery is extremely pretty, the banks above Wiborg being studded with the villas of the leading merchants, whose gardens and lawns slope down to the water's edge. Higher up the forest closes in on either hand, and here and there the spreading branches of the Spruces almost touch the steamer's awning. The stream passes through one or two lakes of considerable extent, and we have to ascend nine locks in the course of three hours' steaming, finally arriving at Rattiarvi, the point of debarkation for the Imatra Falls, whence a drive of twenty-three miles brings us to the great cataract. The country passed through is undulating, partly forest of Scotch Fir and Birch, but mainly cleared land and fairly cultivated, though, to the eye of an Englishman, much in need of drainage in many places. Our vehicle, a kind of waggon, to the floor of which were fixed four chairs and a sofa, was drawn by three horses abreast and driven by a flaxen-haired youngster of thirteen years, who, in true northern style, urged his team into a gallopd own the steepest hills, and allowed them to go to sleep at the flat.

The Imatra Falls, which have been styled the grandest falls in Europe, though in the opinion of my friend and myself less imposing than the Falls of Njommelsaska, described in 'Forest Rambles in Lapland,' deserve a few passing notes. The Vuoksa River, issuing from the south-east corner of Lake Saima, flows for some four miles over shallows and rapids, before reaching the Imatra gorge. Immediately above the Falls it is about four hundred yards in breadth and is divided into two currents by a small densely-wooded island; its banks are also thickly clothed with Scotch Fir and a profusion of fine Birches. The entrance of the gorge is a hundred yards or so across, but it rapidly narrows, and for a distance of some five hundred yards measures no more than from forty to eighty yards in breadth. Down this canal-like passage the great river rushes at headlong speed in a deep torrent of breaking waves and boiling eddies, hurling tall jets of creamy spray and huge masses of white water high into the air, and breaking against the rocks lying at the foot of the confining cliffs with terrific force, the roar of the Fall being heard at a distance of three miles. The depth of the river at the Falls is unknown, but must be very considerable. It is estimated that more than sixty-seven million cubic feet of water pass over the Falls every hour. The colours in the water are green, varied by a light yellow and the snowy white of the foam and spray, and a light blue mist generally hangs over the ravine. There is no sheer plunge, but the fall is a long magnificent rapid of surpassing volume, and the total descent is sixty feet. The Falls are never frozen over; salmon come up to the foot of them, but are unable to ascend higher. There is a cradle over the gorge, worked by ropes; and from this, suspended in mid-air, a superb view of the entire fall can be obtained.

A couple of days were pleasantly spent at Imatra, and our journey was then continued to Lake Saima, the largest, and probably the most beautiful, of all the many beautiful lakes of Finland. Its coast is deeply indented by bays, and its vast surface is studded with countless—it is said, eighteen hundred—islands: some only tiny rocks with a gnarled Pine scarcely finding root-hold; others, several miles in circumference, and boasting a thick growth of forest. It may be said that this grand lake, whose coast-line must measure some three hundred miles in length, is surrounded by forest; but here and there the banks have been cleared, and agricultural land stretches down to the water. The beaches are of a coarse sand, intermingled with pebbles, many of which would be prized by lapidaries. The water is everywhere of a marvellous transparency, and beneath the brilliancy of a sunny sky, which favoured us daily, presented an expanse of glowing blue but little inferior in purity and depth of colour to that of 'open water' in the tropic seas. In a little châlet-like house, picturesquely placed on a wooded knoll at the point where the Vuoksa leaves the lake in a broad blue rapid, the days flew past only too rapidly. Sunrise and sunset alike found us afloat on the lake or river; and when the sun was high, and the daintiest minnow failed to lure the big trout to the surface, we would take long rambles into the depths of the great forest which surrounded our home, our unwary steps rousing the black-cock from a noontide siesta amongst the Birches, or causing a great heron or a string of wild duck to rise from the sedgy margin of some secluded back-water. And when the glorious after-glow died out of the golden West, leaving the great lake ashen-grey beneath the starlight, our boats came slowly home, and there was the tale of the day's fishing to be made up, and the biggest trout to be weighed, ere we ordered in the *samovar* and sat down to supper and tobacco, and a long yarn over a cheery fire of Pine logs.

The forest lake and river made up the landscape viewed from our verandah; and whether at sunrise, when fleecy mists were rising off the lake and shrouding the tree-tops, or at high noon, when under the hot glow of sunshine all nature seemed to sleep—save perhaps some huge trout, whose broad black back would disturb the glassy calmness of the lake as he rolled over in porpoise-like gambols—or at sunset, when the superb colouring of rose and purple and green and gold in the western sky was reflected in long miles of glistening water,—the scene presented natural beauties of infinite charm. It would be difficult to give a definite opinion as to which of the forest trees predominates in this district, though my ideas incline in favour of the Scotch Fir; but the forest is decidedly patchy. For a couple of miles to the southward Silver Birches are most commonly found, and amongst them a few Spruces rear their stately shafts, whilst here and there are scattered groves of Scotch Fir. The undergrowth of Alder and Juniper is in places diversified by the graceful nodding foliage of the Poplar (*Populus tremula*), trees of which, in favoured spots, attain a robust growth and considerable altitude. Ferns flourish vigorously, bracken growing waist-high, and grand clumps of lady-fern being very common, whilst the elegant little oak and beech ferns peep out in tiny groves under the shelter of the huge grey rocks. The floor of the forest, too, is by no means devoid of other colours than green; for the delicate hues of the forget-me-not, the heavenly blue coronets of the cornflowers, the large white and yellow stars of the ox-eye daisies, the deep purple *scabius*, the blue caps of Canterbury bells the white and yellow snap-dragons, and the exquisitely graceful harebells—make bright *parterres* amongst banks of ferns, mosses and lichens; and everywhere the scarlet, white, and brown heads of various species of fungus appear above the coarse grass and drifted leaves. Edible mushrooms are extremely common in Finland, and excellent to boot, and we but seldom sat down to a meal at which they were not served. Amongst the birds we observed were mallard, blackcock, heron, hawk, magpie—almost as common as in Norway—fieldfare, crow, chaffinch, siskin, titmouse, flycatcher and wagtail. On several occasions I could not help remarking the silence prevalent in the forest—on two sunny afternoons especially. At one time I was at the head of a bay, commanding a view over many miles of lake and coast-line, with the forest at my back; at another, on a country road with farms to the eastward and forest to the west. On each occasion not a breath of wind stirred the foliage or rippled the water, and I listened intently for several minutes, and yet failed to catch the faintest sound—even the hum of an insect—to break the absolute death-like stillness. After the roar and hurry and bustle of cities, to gaze on one of Nature's fairest landscapes and note down on one's mental tablets all the glories of lake and island, forest and farm-land, under a cloudless sky in perfect silence, was to me an inexpressible relief.

Amongst the many scenes of beauty surrounding our temporary home, there was one which had a special charm for me. Some four hundred yards below the spot where the Vuoksa issues from Lake Saima, the river expands in the form of a bow, the main body of water hurrying down the chord in huge foam-crested billows, whilst in the arc is a gentle current up-stream, across which the tiny wavelets from mid-river roll gently to the forest-clad shore, and break in plashes of foam on a beach of yellow sand and bright pebbles. As the afternoon draws on the sun sinks gradually behind the dark belt of forest on the western bank, leaving it and the rushing waves of the main current in sombre shade, but still flooding with hot glowing rays the gentle curve of the sandy bay, the foamy ripples on the miniature strand, and the flower-sprinkled forest bank on which I loved to recline. Many a lazy, happy hour I passed here, dreaming over a book, and enjoying to the full the grand rush of the rapids and the exquisite view round a tiny headland over miles of blue lake to the wooded slopes of the northern shore. Here I realized completely that charming picture in 'Westwood Ho!' of the meeting of Amyas Leigh with Ayacanora, saving only that stately Spruces and the glowing hues of the fading Birch foliage replaced the palms and flowering trailers of a tropic clime.

En route again, we proceeded by steamer up Lake Saima to Nyslott and its picturesque old shot-shattered castle, and thence through the northern lakes, ascending by a well-constructed series of locks to Kuopio, a town of 7,000 inhabitants in the heart of the country, celebrated by reason of its trade in timber. Here we were at a distance of nearly three hundred miles from the Gulf of Finland, and the lake scenery through which we had passed was indescribably beautiful, especially when viewed, as in our case, in autumn, when the early frosts had set the Birches aflame with varying tints of orange, scarlet, and gold. In every direction, one gazes up long reaches of blue water studded with forest-clad sedge-girt islands, and all that one can desire to complete the beauty of the scenery is a background of lofty mountains. And southern Finland has no mountains. Some three miles to the north of Kuopio we ascended the highest eminence of the district, a hill of some 700 feet, covered with magnificent Spruces, many of them approaching a hundred feet in height. On the summit is a lofty wooden tower, whence it is said that seven hundred islands can be seen on a clear day. We were there at sunset, and enjoyed the glorious panorama to the full. There was certainly far more water than land within the scope of our vision, and we accepted the geographer's *dictum* already referred to without question. Also, when we had counted a hundred islands, we were quite content to believe that the natives had not over-estimated the number contained within the limits of the horizon, and were only surprised that they did not place it at a thousand.

And I cannot think that any one who has seen the thousand islands of the St. Lawrence, and also taken passage from Wiborg to Kuopio will hesitate for a moment to award the palm for scenery of this character to the glorious lakes of Finland.

A. G. GUILLEMARD.

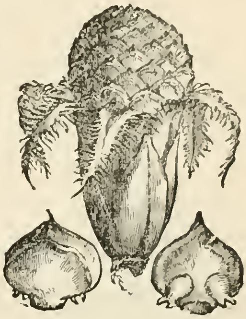
THE BEAUTIES OE BRITISH TREES.

THE PEAR (*Pyrus communis*), so well known in our orchards, is by no means common in a wild state, and does not occur in the extreme north of England, or in Scotland. No doubt, it is often an escape from gardens, so that some botanists deny its claim to rank as an indigenous British tree, dating its introduction from the time of the Roman occupation of our island. It is true that we often lose sight of the fact that this occupation was a period of more than four centuries, or a period as long as that from the Yorkist and Lancastrian wars to our day; so that, though the Roman conquerors to some extent assimilated the conquered Britons to themselves without in any way de-nationalizing them, epicures as they were in the times of the empire, they would hardly fail to introduce into their northern colony such luscious fruits as suited its climate. Nevertheless, one can with difficulty persuade oneself that all three of the varieties of wild pear recognized by botanists, with fruits seldom two inches long, and so harsh in flavour as to be as unpalateable as a crab-apple, are merely the results of rapid degeneration. Nor is there any *à priori* reason against the native character of the Pear. It is in its distribution confined to a limited area in Europe, not occurring south of the Balkans, nor in the northern parts of Russia, Sweden and Norway. This agrees with its absence in Scotland; whilst its presence in a wild state in Ireland, which was never conquered by the Romans, is a difficulty in the way of the theory of its introduction by them.

It is but a small tree, sometimes a mere shrub, and more often twenty feet high than forty; but its rough bark, its upright growth, and pyramidal shape, with pendulous boughs, give it a grace that does not belong to the more straggling Apple-tree, though the rosy blossoms of the latter may be more attractive than the wan blooms of its congener. The branches of the Wild Pear, like those of the Wild Plum, are inclined to be spinous; and the leaves, which are scattered alternately along the young shoots, are crowded together in bunches or 'fascicles' on the old wood. Country-bred folk learn to distinguish at a glance the leaves of a Pear from those of the Apple; but, though it is largely on leaf-characters that the separation of the varieties of the former depend, it is by no means easy to explain those characters in words. The leaves of the Pear are generally on a longer and more slender stalk than those of the Apple, and are consequently more pendulous. Speaking only of the wild forms, they are also slightly smaller, not exceeding one and a half inches in length. They are sometimes heart-shaped at the base, and vary in outline from *ovate, i.e.*, broadest near the base, through *oblong, i.e.*, with approximately parallel sides, broadest across the centre, to *obovate. i.e.*, broadest near the point. On young trees the leaves are often lobed, and in all cases they are at first pubescent, at least on the under surface. They are acutely pointed, though the apex varies from an abrupt point (*cuspidate*) to a long and tapering one (*acuminate*).

By about the middle of April the Pear-trees ought, in favourable seasons, to be in full bloom; a snowy sheet over the landscape of our suburban orchard-gardens that has, at that early date in spring, quite a chilly effect upon the senses. The flowers, however, continue for some time, being generally over by May 15th, and sometimes earlier, thus preceding the warmer-tinted Apple blossom by about a fortnight; and in this time the young foliage has made rapid strides, so that the white mass of blossom is soon relieved by a delicate background of tender green. The flowers are grouped in flat-topped, or 'corymbose' clusters, and each one of the bunch is an inch or an inch and a half across, the same size, that is, as those of the Apple, from which they are technically distinguished not by their colour, but by having their styles distinct to the base instead of being united below. This union, of course, takes place later, when the so-called 'calyx-tube' binds together the five carpels into the single Pear. Then, when the more or less top-shaped (*turbinate*) or pyriform fruit furnishes another specific distinction from the Apple, the Pear, in favourable autumns, exhibits a charm which perhaps surpasses those of the pure white and virginal green of spring, its leaves turning to a most vivid crimson, to a tint, in fact, which in other British trees is, as a rule, confined to a leaf here and there among duller hues. Thus, apart altogether from the value of the fruit in the cultivated varieties, the Pear-tree well deserves a place in the cottage garden, the farm close, or the shrubbery. Its deciduous character may render it undesirable for the lawn; but I can imagine few more delightful surprises than to come upon a well-grown Pear-tree standing apart in a small woodland clearing, whether in spring or in autumn.

Of the three wild varieties, none of which can be termed common, *P. pyraster* has 'acuminate' leaves, which, though downy beneath when young, become smooth, and a typically pear-shaped fruit, tapering gradually into its stalk; *P. achras* has broader leaves, more abruptly pointed, which always remain downy or flocculent below, and a more globular fruit, rounded at its stalk end; whilst *P. briggisii* has almost smooth leaves, heart-shaped at the base, and a very small globose fruit. As the habit of growth appears to be the same in the three cases, there need be no preference in planting.


FEMALE INFLORESCENCE OF PINUS SYLVESTRIS.

THE PINE, or SCOTCH FIR (*Pinus sylvestris*). There can be no hesitation in saying that it is only in Scotland that we now have this noble tree in a wild state. It occurs in the mountains of Southern Europe and in the lower ground of higher latitudes, being found in the Scotch Highlands at an altitude of 2,200 feet above the sea. It now forms a vast belt of forest land across Siberia and Russia into Prussia, Sweden and Norway, and was in former ages found beneath the bogs of Denmark, Ireland and our English fen-land, and in submerged forests both pre-glacial and post-glacial in age. It is much planted on sandy soil in hilly situations throughout England, since it will flourish in many situations where the more rapid growing larch will not. This is the case, for instance, with the Bagshot sand area of north and west Surrey and with the lower green sand wastes of the middle of that county and of Bedfordshire, and far better is it that those immense tracts of country should thus be turned to account by the tree planter than that they should be abandoned to the heather.

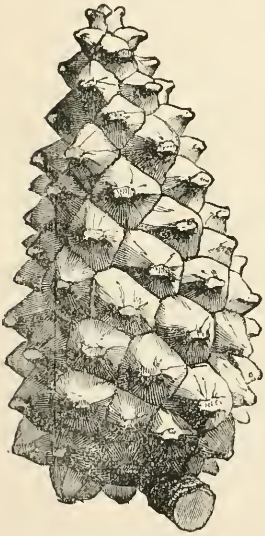
Accustomed as we are to the short, much-branched stems of our deciduous, or hardwood trees, the Pine is to us the very type of lofty uprightness. Its straight stem, sometimes as much as twelve feet in girth, attains a height of from fifty to a hundred feet; but most of us who remember them from our earliest years will echo Hood's reminiscence of their impressive grandeur:

> 'I remember, I remember
> The fir-trees dark and high;
> I used to think their slender tops
> Were close against the sky;
> It was a childish ignorance,
> But now 'tis little joy
> To know I'm further off from heaven
> Than when I was a boy.'

One of the great beauties of the tree is its rough reddish bark, made up of flaky scales deeply ridged down the stem, giving it a curiously mottled effect. The branches, those 'thick mysterious boughs,' as Tennyson calls them, are not usually large in proportion to the trunk, but they are given off numerously in whorls, so that, since when trees are grown together the lower boughs die off, as Shakespeare says—

> 'Knots, by the conflux of meeting sap,
> Infect the sound pine, and divert his grain,
> Tortive and errant from his course of growth.'

The leaves, or 'needles,' are given off in pairs from the axil of a membranous, fringed sheath. They do not exceed two or three inches in length, although in allied species they are sometimes as much as a foot long; they are grooved along their upper surface, and finely toothed throughout their length; and they remain on the tree for two or three years. It is their remarkable dark indigo-tinted colour that lends to the tree the air of gloom with which it is generally associated, an effect which is heightened by the silent, bare, needle-carpeted ground beneath them, where scarcely anything will grow, owing to the absence of light. At a slight distance the young leaves produce quite the impression of a bluish hue, which no doubt led the Laureate to associate the Pine with 'many a cloudy hollow.'



PINE CONE.

The tree generally flowers in May, its flowers being monœcious, that is, both male or pollen-bearing ones, and female, or seed-bearing ones, being borne on the same tree. The former are small, yellow spikes of scales, each bearing a single two-chambered anther, and when the pollen is discharged, producing as it does in the Granpidus those 'showers of sulphur' that once alarmed and amazed the ignorant beholders, the whole catkin falls. The female cones on the other hand remain, of course, until the seeds they contain have been ripened and discharged. They occur generally in twos or threes, each of an ovoid outline tapering conically upwards, but hanging when young in a drooping position by their stalks. The scales, which are not many in number, are of a rhomboid form, and end in a point which withers before they become woody. It is not as a rule until the second year that they ripen, when the scales bend outwards, so as to let the winged seeds escape from between them. Thus it is that the close packing of the scales serves until the seeds are ripe, every purpose of the closed ovary which distinguishes *Angiosperms* from such *gymnospermous*, or technically naked-seeded plants, as these Firs.

The seeds which, in some allied species were large enough to be valuable as human food, are furnished with a brown membranous wing three times their length. This closely resembles, and performs the same purpose as, the 'samaras,' or winged fruits, of Elms and other trees, the disposal of the seed away from the parent tree being the object in either case. The curiously formed beak of the cross-bill, a rare visitant of our islands, is specially adapted for the extraction of pine seeds.

Few plants yield a greater variety of useful substances than the Pine. Tar, pitch, turpentine, resin, and deal are the chief, the tree being mainly imported as timber from Dantzic and Riga. Thus, though generally associated in the minds of poets and painters with mountain scenery, there is no doubt that the finest Pines are grown in lowland plantations. In England, at least, the primary use of the tree, from which, in fact, the name of 'Fir,' *i.e.*, fire tree, is derived, viz., the making of torches from its resinous wood, is a thing of the past; but, though neither so rapid in its growth nor so remunerative a crop as the Larch, there are still many good reasons for planting Pines.

As has been already mentioned, they will grow where Larch will not: they form an invaluable shelter from the wind sweeping over wide stretches of heath; and if perhaps too gloomy in their appearance and too destructive to all vegetation beneath them to be very desirable in park or garden close to the homestead, no trees form a more picturesque belt in the distance, crowning a hill or skirting the domain.

The popularity of Bournemouth as a health resort is in itself a testimony to the real value of that aroma that seems to invigorate one at every whiff, even among the glaring sands of the hottest and most relaxing situations. I have in my mind's eye while I write, a heath on a lofty sand-hill on the borders of Bedfordshire and Buckinghamshire, from which stretches away to the west and north a wide landscape of fertile farms, pastures and woodlands, whilst on the south and east lies a thick wood of Scotch Fir, and, in the bay thus formed, a comfortable house stands among broom and heather. I can imagine few finer situations.

Mr. Ruskin has described in his graphic prose one of the most wonderful effects of Pines in a landscape, though, as he points out, it has only been noticed by two of our poets. 'When,' says he, 'the sun rises behind a ridge of Pines, and those Pines are seen from a distance of a mile or two against his light, the whole form of the tree, trunk, branches and all, becomes one frost-work of intensely brilliant silver, which is relieved against the clear sky like a burning fringe, for some distance on either side of the sun.' This phenomenon it is to which Shakespere alludes when he makes the heroic but ill-fated Richard II. speak of the sun, 'when from under this terrestial ball he fires the proud top of the eastern Pines;' and this, too, Wordsworth refers to more precisely in his 'Stanzas composed in the Simplon Pass:'

> 'My thoughts become bright like yon edging of Pines
> On the steep's lofty verge: how it blacken'd the air!
> But, touched from behind by the sun, it now shines,
> With threads that seem part of his own silver hair.'

G. S. Boulger.

THROUGH SHERWOOD FOREST.

IT has always been a matter of speculative moment, whether such a romantic freebooter as Robin Hood ever dwelt amid the sylvan beauties of Sherwood Forest, or ever carried on that system of delightful plunder with which his memory is always associated. Few persons indeed are unacquainted with the names of Robin Hood, of Maid Marian, and of Little John; and while Rip Van Winkle will ever be remembered by the gushing American, these heroes of the forest and glade will not be allowed to perish in English minds for lack of kindly thought and affectionate remembrance. Although grave doubts are exercised regarding the existence of the gallant 'brigand' of the forest, there are no doubts entertained as to the existence of the leafy domains where he is reputed to have lived and thriven on venison and wine, for Sherwood Forest is of too great a magnitude to be overlooked in this toiling land of ours. It is undoubtedly one of the largest—if not *the* largest—forest within the limits of this Island, and at one time its acreage must have been scarcely computable. With the extending prevalence of civilising ideas, and nineteenth-century progress, a great amount of deforestation has taken place, and the Sherwood of to-day is not what it was one or two centuries ago. The axe of the forester is constantly heard ringing through the woods, and many a fine monarch has been laid low by the pitiless blade of the sturdy yeoman. Large tracts of land have been cleared, and corn is waving to-day where a dense and almost impenetrable forest once existed.

The capital of Sherwood Forest is claimed by both the towns of Mansfield and Worksop, and it is difficult to decide their respective claims to that honourable title. The northern part of the forest is generally denominated the 'Dukery,' and the southerly portion is distinctively known by the name of Sherwood. The quaint town of Worksop therefore may be said to be the capital of the 'Dukery,' and Mansfield to be the capital of Sherwood. The inhabitants of Yorkshire and the northern counties invariably journey to Worksop, if desirous of visiting the forest, while the dwellers in the counties of the sunny south wisely choose the route to Nottingham, and drive from thence to Mansfield, or pass along the railway to that ancient and interesting town. Starting from Mansfield the tourist proceeds for a short distance along the highway leading to Worksop—passing at a tangent the pretty village of Mansfield-Woodhouse, formerly the seat of the Digby family, who were distinguished for their loyalty to the Stuarts—and then diverges to the highway which would eventually bring him to Ollerton and Retford. Views of the forest are to be obtained in every direction along the route, and the large tracts of corn-growing land brightly intersperse the sombre wilderness of forest, and make up a scene of picturesque beauty. Having wandered for about three miles along a highway overhung with the fragrant Lime and the deepening foliage of the Elm, the first object of interest is to be seen close beside the road; and this old memorial of the dead past is often unnoticed by the visitor as he saunters leisurely along. It is the skeleton, so to speak, of an Oak tree that at one time must have been of huge dimensions, and capable of giving shade to hundreds of men. It is generally known by the name of the 'Parliament Oak,' tradition asserting that King John, of Magna Charta fame, who was an ardent devotee of sport, and occupied during certain seasons of the year a palace in the woods at Clipstone, for the purpose of facilitating his deer-hunting proclivities, once had occasion to call his parliament together, and the senators of his court assembled under the gigantic Oak which now stands near the highway. Whether such traditional information is correct, cannot well be ascertained; but great care is taken of the 'relic,' and it is chained together, so that a dissolution of the trunk cannot easily take place. For 600 years it is supposed to have withstood the blasts of winter, and many years will yet elapse before it ceases to give that cooling leafy shade which the pedestrian is so grateful for in the hot days of summer. Passing on, the entrance to the 'real' forest is gained, and when the traveller espies an old weather-beaten mill, with sails idly flapping in the wind, he had better ascertain his moorings; and the courteous vendor of lemonade close by will speedily put him on the right track. Leaving the highway, and passing through the gate on the left side of the road, the tourist will be struck at once with the youth of the trees composing the part of the forest surrounding him. If he expected immediately to see immense Oaks, bearing evidence of centuries of age, he will be disappointed, because all around are trees whose age can easily be computed. The last owner of Welbeck, and of the title of Duke of Portland, commonly designated the 'Invisible Prince,' was careful to keep up the forest by planting thousands of trees, and every clump bears the year in which they were planted. The visitor will therefore have to wander for a mile or two before he emerges in view of the veterans of the forest. He will, however, have a compensating pleasure in noting the extreme regularity with which the trees have been planted; and on a day bright with genial sunshine, the scene is almost beyond parallel. Along each plantation is a magnificent glade, with grass of the freshest hue, and while the undergrowth in the woods reaches several feet in height, no stray bracken or furze is allowed to encroach on the gorgeous carpet of green. There may be seen picnic parties by the dozen; and if the visitor listens, he will catch the sound of a buzzing saw, and come to the right conclusion that there is a saw-mill right in the heart of the forest. Turning to the right, a very remarkable sight is reached. This is the 'Shambles Oak,' the remnant of an immense tree, with a trunk half hollow, and half destroyed by fire by some forest Vandal. It is stated that here Robin Hood used to conceal the venison he had procured in the chase, and from the size of the interior, it may easily be conjectured what amount of booty might be concealed. Like the first-named 'relic,' this *ci-devant* monarch of the forest is carefully chained, and sustained, like a paralytic, with crutches and supports, so that the traditional monument shall be allowed to escape the fate Lucifer, 'to fall and never to rise again.' Travelling on, the division line between the estates of the Duke of Portland, and the Earl of Manvers, is reached; and it will be seen that the fenced line of one mile consists entirely of Holly trees of singular height and size. Between the two estates a splendid glade runs down to the confines, and a fine old Oak occupies the sole position in the open space of green. Passing under the Norman arch the traveller enters the second ducal estate, and the wild beauty of the scene astonishes him more than the orderly charm which he met with in the forest he has left behind him. Here all nature is in 'uproar wild and disarray,' presenting the most effective contrast to the forest he has passed through. There is no neatly marked carriage-way of red and white sand, no beautiful glades of emerald green, and no groups of trees standing like soldiers on parade. Everything in this part of Sherwood is tropical in its profusion and wildness, and the silvery Birch nestles under the giant Oak, while the Elm bends over the turfy footpath, and shelters the traveller from scorching heat. A long line of turf alone shows where the pedestrian may proceed; but if he is wise, he will turn to the right and proceed along the carriage-way, which is as full of pebbles as the seashore. Bracken and gorse almost envelope him, while millions of flies come from all parts of the forest to pay him homage. Half a mile further on he may sit down and rest on the roots of a forest king, the 'Simon Forester,' as it has been designated by the dwellers in the vicinity, and admire the immensity of the trunk, and the extent of the shade it affords. Such a monster is rare in the forest, or indeed in England, and it is to be hoped that no forester, whether the famed 'Simon' or his descendants, will ever be allowed to lay the axe to its roots. During the interval, the 'sublime weed' will help to dispel the flying pests which are so demonstrative in their affection, and he will be able to proceed along the pebbled way refreshed, cooled and invigorated. Three furlongs further on, through a wilderness of tangled forest, presenting every variety of foliage and tint, the crowning triumph of his labour is reached, and he again sits down under the shade of one of the mightiest Oaks that exist in England. This is the famous 'Major Oak,' the photographic picture of which he will be able to purchase from the old man of the woods who constantly inhabits its vicinity. He will be lucky indeed if he can sit down on the immense roots without being interrupted in his cogitations by the presence of a party bent on enjoyment. This is the 'happy hunting ground' of the Nottingham lace-maker, and the Sheffield grinder, and no better *locale* could be imagined. The venerable Oak stands in the centre of an acre of beautiful turf, and can be viewed in all the glory of its proud position. The size of its trunk can be imagined from the fact that seven full-grown persons can only clasp hands around it, while its hollow interior has been known to accommodate a dozen persons. The spectator is astounded with its size, and not only is it the monarch of the forest, but its branches spread out to form a picture of grace and surpassing beauty. There are no lightning-shivered branches or ungainly growth: all the *pose* of the tree is exceptionally majestic, and such as many an artist has loved to delineate. Here he may rest, and gaze upon the aspect of loveliness which surrounds him, and when he has sufficiently admired the thousands of Birches with their shimmering leaves—the Chestnuts with their wealth of foliage—the golden-crested Gorse, and the undulations of woodland scenery, unmatched in its beauty,—he will be content to seek the quietude of the village inn, and ruminate on his wanderings through one of the most picturesque forests in the kingdom. Further on he would encounter an army of great Oaks, and the magnificent mansion of Thoresby, standing in a park of 3,000 acres, with pretty Pearlthorpe Church, and historic Clumber—the heritage of the young Duke of Newcastle—in the far distance. But premising he is content with his walk through one section of the forest, he had better strike a 'bee-line' from his resting-place, and in a few minutes he will be approaching the village of Edwinstowe, with its quaintly constructed church, where Maid Marian is said to have been united in the bonds of matrimony to her forest lover Robin Hood. In this old-world village he will be able to find the needful rest and accommodation, and will not be ungrateful for the simple fare set before him, nor unthankful that he has been able to enjoy a sight of Nature's beauties in their lavish loveliness.

N. HARTLEY ASPDEN.

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THE TIMBER TREES IN ALGERIA.—The forests comprised in the colonised parts of Algeria include at the present time some 15,000,000 trees; 6,000,000 large forest trees and about 9,000,000 mulberries, resinous, and ornamental trees. According to the official returns there are 278,325 hectares covered with the cork oak, 605,622 with evergreen oak, 42,742 with cedar, while the remainder of the forest area is occupied by the tree known as oak-zeen, Aleppo pine, thuya, wild olive, broom, &c. The majority of the cork trees are in the province of Constantine, fringing the coast line of La Calle and Bougie. Here, also, grows the oak-zeen, peculiar to Algeria, which resembles the white oak, but has a leaf like a chestnut. Some of these trees, especially in the forest of Skira on the Tunis frontier, grow to a colossial size, and are excellent for shipbuilding purposes. The chestnut flourishes in the forest of Edough, near Bona, while the plains in the neighbourhood of the coast contain elm and ash, and the river valleys willow, elder, and poplar. The lower chains of the Atlas range are covered with evergreen oak, mingled with broom and sweet acorn oaks. On the ranges above are the thuya Aleppo pine and maple, though these latter are limited in their localities, such as the Aures Hills and the environs of Bathna, where the summits of the mountains are thickly planted with cedar. Towards the coast of the province of Algiers are the forests of Sahel and Mazafran, near Koleah, the latter possessing huge ash trees interlaced with the wild vine; but the true forest country does not commence until we reach the Atlas Mountains, where are the forests of Ak-Fordoun, with very large oak-zeens, the forest of Beni-Menasser, consisting principally of wild olive, the forest of Ourensenis, of thuya and Aleppo pine, and the venerable forest of Teniet-el-Haad, where the cedars are from 15 ft., to 18 ft. in circumference, and from 45 ft. to 100 ft. in height. The province of Oran is erroneously said to be bare of trees, but though they are rather scanty in the coast section, the plateaux of the mountains are heavily timbered, especially beyond Mascara, as far as Sebdou. The forest of Duya in this neighbourhood is at least 40,000 acres in extent, principally of evergreen Oak, Thuya, and Aleppo pine.

Fig. 1

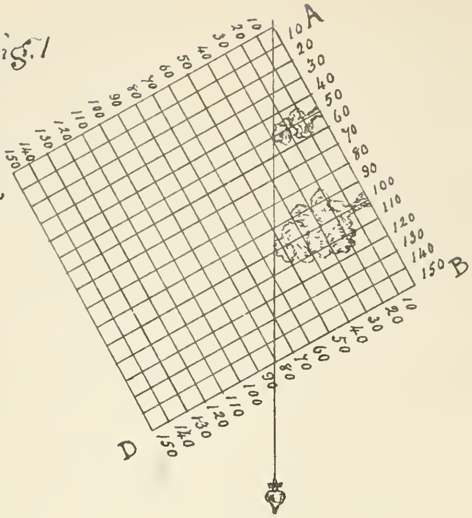


Fig. 2

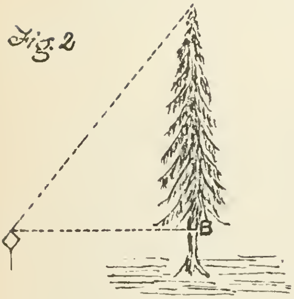


Fig. 3

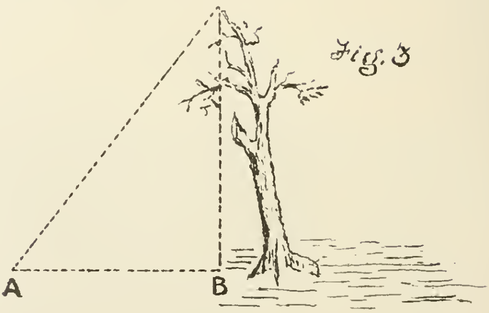
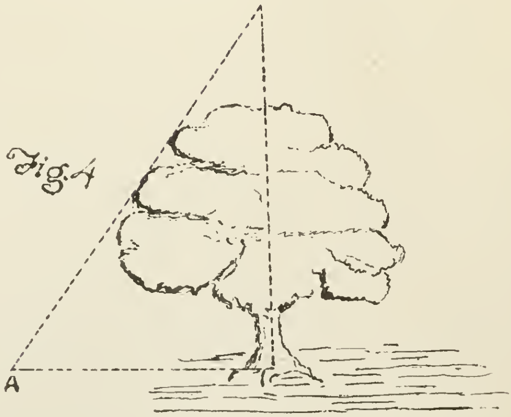


Fig. 4



KAY'S DENDROMETER.

FOR MEASURING THE HEIGHT OF TREES OR ANY OTHER OBJECT.

THE principal advantages of this instrument, which has been awarded a first-class silver medal by the Scottish Arboricultural Society, are the following:—First, its simplicity; second, no calculation is required; third, the height of an object can be obtained at any convenient distance; and fourth, the height of any part of a tree, such as length of bole, can be ascertained from one station.

Construction.—The construction and application of the instrument, which will be seen by the accompanying engraving (see Fig. 1) is founded on the principles which apply to all right-angled triangles. The side A. B. may be termed the base-line, or the distance the observer stands from the object the height of which he wishes to ascertain. The horizontal lines at right angles to the base-line represent the altitudes or heights. The height of an object is shown at the part where the plumb-line suspended from the point A. crosses the line of altitude corresponding to the distance from the object on the base-line; and the numbers along the top and bottom show the number of divisions corresponding to the altitude or height that the plumb-line has arrived at on the line of altitude.

The lines of altitude are drawn at every foot, and the base-line at every five feet, so that the observer can choose any convenient distance from the object at every five feet.*

The divisions may represent feet, links, or yards, but whatever standard of measure is fixed on for the base-line, the altitude must be understood to be the same.

The divisions extend to 150, and thus represent a height of 150 feet; but should it be found necessary at any time to measure a greater height, the divisions may be termed yards when a height of 450 feet can be measured.

Mode of Using.—Measure a base-line from the centre of the bole of the tree of a length suitable for observing the height of the object, and fix the staff in the ground at that point. Then, setting the instrument in the direction of the object, turn the square till the plumb-line falls right over the line A. B. (see Fig. 1). Fix the square by the clamp screw and look through the sight C. A., and mark the place on the object thus indicated as at B., Fig. 2. This will give the level corresponding to the height of the observer. Next, slacken the clamp screw and elevate the sight till it corresponds with the highest point of the object, when the clamp screw is again fastened and the height read off, the plumb-line showing the exact number of divisions on the lines of altitude corresponding to the height of the object. The part below the level of the observer is then added to the observed height, which gives the total height of the object.

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* The accompanying diagram being on a small scale, the lines are only drawn at the tens.

Fig. 1 shows more clearly what takes place in making an observation. Thus, with the plumb-line falling over the square as indicated with a base of 50 feet, we would have a tree of 26½ feet in height; and with a base of 100 feet we would have a tree of 53 feet in height; the altitudes being always in proportion to length of base.

TO MEASURE THE HEIGHT OF A RECLINING TREE.—In measuring the height of a reclining tree, care must be taken not to measure the base-line from the centre of the bole, but from a point on the ground perpendicular with the highest part of the tree, which is ascertained by holding a plumb-line between the eye and the object, and marking the place thus indicated on the ground as at B. (see Fig. 3). In finding the perpendicular the observer must stand at right angles to the base-line by which he intends to ascertain the height.

Note.—If the base-line were measured from the centre of the bole, on the side the tree is leaning to, it would give too great a height; and if on the side the tree is leaning from, it will give too little.

MEASURING THE HEIGHT OF ROUND OR FLAT-TOPPED TREES.—In measuring the height of round or flat-topped trees the observer must choose a station sufficiently far back to have a view of the highest part. If viewed too near, as at A. in Fig. 4, it is simply impossible for the observer to see the highest part of the object, and the result is that the height is greatly increased. Therefore, in order to avoid such errors, the object should be viewed as far back as possible, so as to obtain a view of the highest point right over the true perpendicular; or in the event of this not being possible, the perpendicular and height of some definite point may be ascertained as in Fig 3.

Note.—The height of any part of an object may be ascertained by subtracting the result of one observation from that of another.

Messrs. Dicksons and Co., 1, Waterloo Place, Edinburgh, are agents for the sale of the Dendrometer, the price of which is 17s. 6d.

'THE INDIAN FORESTER' for September, edited by W. R. Fisher, B.A., has reached us. It contains, besides the continuations of previous articles, papers and notes on the rate of growth of Teak in Burmah, on demarcating forest reserves, on the cultivation of the Bean, and on experimental plantations of Usar, &c.

We have also to acknowledge the receipt, from the Ministerial Department of Crown Lands and Public works for the Cape of Good Hope, the report of the Superintendent of Woods and Forests for 1882. It is published by W. A. Richards & Sons, Government Printers, Castle Street, Cape Town (1883); also 'Suggestions regarding Forest Administration in the Hyderabad Assigned Districts, and Review of the Forest Administration in the several Provinces under the Government of India for 1881-2,' both by W. Schlich, Ph.D., and printed at Calcutta by the Home Department Press (1883).

THE INDUSTRIES OF SHETLAND.

BY HENRY EVERSHED.

THE landlords of Shetland are generally Scotchmen, successors to the feudatories to whom the land was granted two centuries ago. I shall therefore commence this brief statement with a short sketch of the history of the islands. All the historical accounts of Shetland commence with Harold Harfager; or, at any rate, they soon overtake that fair-haired king, and invariably enlarge on his career.

While Iceland was being peopled by emigrants from Norway, Shetland was being conquered and peopled by the same parent race under Harold Harfager. There is a legend that the noble heathens who then colonised the habitable strips and patches of the shores, found among their predecessors a certain number of Christians, as in Iceland, where the Papæ are said to have preceded the Norsemen. The island of Papa in Shetland was perhaps the retreat of the last of the original race, and their burial ground on their extermination. The men who danced the sword dance before Magnus Troil and his guests, were from Papa, and here and in Foula there were, till lately, a few remaining performers.

Most of the existing names of places in Shetland date from the Norwegian invasion. Haroldswick, in the north of Unst, is the name of the bay first entered by the ships of Norway. Hermaness close by is named from Herman, a giant of that period. Vallafeld, Crucifeld and Hanger Heag are other Norse-named hills in Unst, the latter being a place of execution, while a heap of stones on a neighbouring peak, marked the spot which the law allowed the criminal a chance of reaching by favour of the spectators.

But the principal court of justice was on the margin of a small loch near Scalloway, at Tingwall, or the valley of the Ting, a name corresponding to Thinga-valla in Iceland, and Dingwall in Scotland. The site of the present church of Tingwall was the ancient sanctuary, or refuge, of the criminal.

It is impossible to keep Harold out of this narrative, since it was his conquest which rendered Shetland a colony of Norway and a Scandinavian earldom, held of the kings of Norway and Denmark during many centuries, mortgaged at length by a king of Denmark to Scotland, and finally accepted in 1468 by James III. as the dowry of his consort Margaret, Princess of Denmark.

The islands, having been annexed to the Crown, were granted to various donatories—to Lord Robert Stuart, Abbot of Holyrood, and natural brother of Mary Queen of Scots, to her favourite Bothwell, and later on to the Earl of Merton, the favourite of Charles I. The gift remained in his family a hundred years, when some of the judicial privileges were resumed by the Crown, while others, including proprietary rights, were sold by the then earl to Sir Lawrence Dundas, the great great grandfather of the present Earl of Zetland, for £60,000. During the rule of the Stuarts the oppressions of the islanders were of the most atrocious kind. European history offers no other such example of excessive cruelty and wrong as that of the Stuart rule in Shetland during the sixteenth and seventeenth centuries. The Royal, but illegitimate Abbot, commenced his rule by a personal visit to his dominions, backed by a band of 'soldiers and broken men,' with whose aid he robbed and oppressed the people.

Lord Robert was succeeded by his son Lord Patrick, builder of the Castle of Scalloway—a square tower typifying in ungraceful ugliness—for not a sprig of trailing vegetation decorates the ruin—the unhappy government of Shetland under the Stuarts.

He was executed in 1613, not for treason against his species and his Shetland feudatories, but for an offence against the Crown. It is a natural sequence to this story that the land should have fallen into the hands of Scotchmen.

It is needless entering upon this part of our subject in detail. Suffice it to say that the terms of the transfer of Shetland to the Scottish Crown were violated, and that feudal tenures were introduced and the ancient rights of the Udallers set aside. Most unfortunately for Shetland it lay too far off from Edinburgh, in the reigns of the Stuarts, to secure such protection as their century afforded. All sorts of charges, such as witchcraft and other crimes, were brought against the unfortunate Udallers, for the purpose of dispossessing them. Any excuse sufficed to deprive them of their land.

The present condition of Shetland has arisen out of the circumstances I have now described.

By far the most lucrative of the two industries of Shetland—fish-curing and farming—was introduced by the Dutch, the people having been too poor and ignorant to avail themselves of the riches of their own productive seas. In establishing the trade of catching and curing fish, the Dutch hired a sufficient quantity of land, including a convenient beach, set up their stores, or 'booths,' and engaged native fishermen, advancing them whatever might be necessary for the purpose of carrying on the business. It is evident that the system known as 'Truck' was a necessary part of the arrangements between the Dutch and the people they employed, and although the Dutch have withdrawn from Shetland, Truck still remains.

It is most fortunate for one who would describe Truck that several parliamentary volumes, full of evidence and free from bias, have been compiled for his use. I refer to the Reports of two Royal Commissions, which have sat on Truck in Scotland and Shetland within the past twelve years. I shall gladly avail myself of such guidance when dealing presently with Truck. But I will take the fishing first. The wealth of the water in this northern archipelago is endless. Fish are caught both for salting and sale and for food, by old and young, with lines and nets, and the numerous sorts vary in size from a piltock to a Ca'ing whale; that is, from three inches to thirteen feet.

The fish used in curing are ling, tusk, saith, and cod, which are taken in open boats at various distances from the shore. The quantity of fish cured in Shetland exceeds that of all the rest in Scotland. There is a considerable herring fishery besides the fish for home use, such as young coal fish, called sillocks and piltocks at different ages, which are caught with rods in the voes, and form in their season an important part of the food of the people. Lobsters are taken largely. The halibut is constantly produced at table, and in order to avoid the prejudice of strangers, it is invariably served under the name of turbot. For the same reason, perhaps, the fish when it weighs more than a hundredweight is never placed on the table whole! Haddock and whiting abound, but for want of a market they are not much caught. The loch trout are almost equally neglected, except by occasional anglers, on account of the distance of the lochs from the houses. Whales are caught by driving them ashore in the shallow bays.

Some recent large arrivals of whales have proved a boon to many poor families. The Ca'ing whale of Shetland is much smaller and less productive of blubber than the Greenland species; still it is welcome, and its periodic arrival in the shallow bays is always a time of great rejoicing. The island of Unst had not for a long time been blessed in this way. 'O Lord! dinna forget the poor island of Unst,' was a form of prayer which the minister of that island used some years ago during several seasons. At last the whales came, a God-send on a Sunday morning.

A more undemonstrative race than the fishermen of Shetland, incomparable seamen as they are, cannot be imagined. But when a drove of whales is reported off the coast hovering about the entrance of a bay well suited to their capture, the question whether they will enter or make off and the business of endeavouring to coerce them, throws the whole population of the neighbourhood into an ecstacy of excitement. Old Waller must have witnessed a whale hunt when he wrote in his 'Battle of the Summer Isles'—

> 'They man the boats, and all the young men arm
> With whatsoever may the monsters harm;
> Spikes, halberts, spits, and darts that wound so far;
> The tools of peace, the implements of war.'

From a commercial point of view the stranding of a good drove of whales is almost equal to the wreck of a richly-laden Dutch galleon in times past. The division of plunder which followed upon the wreck is repeated in the case of the stranded whales. Each person who had aided in the capture receives his share of the value of the blubber, which not infrequently amounts to several pounds for each individual, and secures for his family a variety of comforts which they do not usually enjoy.

Under the circumstances it is not surprising that the news of the near neighbourhood of a drove of whales should spread like wild-fire. All the fishing boats within reach are soon at sea and waiting for orders. The object is to drive or persuade the whales, and as unanimity of action is essential to the success of the enterprise, some person of acknowledged authority is at once called to the command by the general voice. At the hunt which I shall endeavour to describe, the management of an unusually large flotilla of fishing boats, and the critical business of driving several hundred whales was admirably performed by the principal laird of the locality.

The first order of our captain postponed the action till several reinforcements of boats, which were seen putting off from the neighbouring islands, had arrived. The whales, flocking like sheep, according to their usual habit, were hovering in the offing of one of the little sounds which abound in these broken coasts, having within it a small shallow bay admirably adapted for the stranding of the whales if they could be induced to enter it.

Shetland whales, called usually Ca'ing whales, behave, when driven, very much as sheep do. If they are managed with tact, all goes well; if they are hurried and pushed too hard, they become alarmed and bolt like sheep in the wrong direction and when this occurs the prize is lost, and the whales return pell-mell to the deep water. The successful driving therefore depends in great measure on the skill and tack with which the leader marshals and restrains the various crews which for a few hours he commands. The laird was equal to the occasion. After arranging the flotilla in the form of a crescent at a proper distance from the whales, he gave the signal. And then commenced the customary uproar of a whale hunt, shouting, plunging great stones in the water, scraping of fiddles, banging of kettles. No kind of noise or splashing comes amiss on such an occasion, provided it is carried on at a proper distance in the rear, so as to keep the game moving onwards, astonished but not alarmed.

As soon as the whales had fairly entered the deep water of the sound a few fast skiffs were detached to hang on their rear in front of the squadron till at length, by dexterous manipulation they were pushed and guided into the bay where they were ultimately captured. The entrance to this fatal trap is a narrow one, and the water within is so shallow that the whales had no sooner passed through the channel than we could plainly see their fins and cleft tails above the water, and the hunt was henceforward carried on with the quarry in sight and drifting every moment into greater danger further on in still shallower water.

Presently several of the big 'fish' suddenly faced about, making a movement not uncommon among their tribe. In a description written as long ago as 1809, Dr. Trail, one of several naturalists of his name and family in Orkney, mentioned this trait:—'I once,' says Dr. Trail, 'was in a boat when an attempt was made to drive a shoal of them ashore; but when they had approached very near the land, the foremost turned round with a sudden leap, and the whale rushed past the boat.' The habit of following their leaders obtained for the Ca'ing whale the name of Deductor. In our case it was an exceedingly anxious moment when the Deductors faced about. They had been driven a little too hard, some of the excited crews having taken their boats in front of the line, and they were evidently on the point of rushing out to sea. But the exertions of the laird saved the day. Standing in the bow of an eight-oared boat with his hat off, shouting at the top of an exceedingly strong voice, he was rowed to and fro. William the Norman at Hastings, or Richard III. at Bosworth, could not have excelled him in regard to perspiration or personal endeavours. Borne along the front line, as I have said, by the steady pulling of eight strong oars, he succeeded in restraining the too eager crews which had occasioned the danger.

Once more the whales moved towards the shallows, puzzled like sheep when they are driven over new ground, but still without showing much alarm. The Ca'ing whale is, in fact, the sheep of the Shetland seas, and the boatmen drive him just as shepherds drive their flocks, firmly but cautiously, so as to avoid a panic.

The admirable management of the laird was crowned with success. Henceforward the hunt continued without a hitch. Any outsiders or wanderers from the drove were pursued and headed by boats, rowed with might and main in order to turn them back towards the main body. Fugitives were brought up sharply. Any serious diversion of the main body was arrested by stones showered into the water. In the rear and on the distant flanks a constant din was kept up by shouting and splashing, and in front the fast skiffs performed their delicate task successfully.

On reaching a narrow channel leading to the shallows where the hunt ended, the whales paused and seemed to hesitate, and at this moment a most exciting incident occurred in a sudden rush of the leader—the bell wether of the flock—in the wrong direction. Instead of running ashore as he ought to have done, he evaded it and dashed off madly along the beach with several companions, their backs above water.

The crisis of the day had now arrived, when our admiral, in sight of the entire fleet, gave chase, and getting alongside of the Deductor, took deliberate aim, and sent two bullets into his body.

After this brilliant movement, which was cheered to the echo and seen at once to be decisive, the final triumph followed. The bullets by no means diminished the activity of the Deductor, but they occasioned an immediate retreat among the ranks of his devoted followers. A panic then ensued, when the whale rushed upon the sands and became safely stranded. This was the catastrophe of the hunt, and all the crews, with another cheer, took the water and were soon wading among the moving tails and backs. Any whale which was not sufficiently grounded was now taken by the fins by two men and conducted into shallower water, and then beached upon the belly, and then one by one each whale was stabbed to death, the orthodox method of performing the operation being to lift up a fin and deliver the stab beneath it.

The Ca'ing whale dies hard, and the state of insensibility which follows the fatal stab is succeeded by heavy lashings of the tail; and then follows a short, death-like trance, followed by fainter throes, repeated with brief interruptions till the dying flurry commences. During the final struggle the animal utters those piteous cries which have been compared to the most plaintive accents of the human voice. This piteous cry which it makes when molested or when stranded on the beach, and which brings its companions crowding to the spot, gained for it the name of Ca'ing, or Calling, whale.

The creature whose capture I have been describing is probably the most harmless of all the 'monsters of the deep.' But although he is perfectly free from vice, he is addicted to laying about him heavily with his tail in the last moments of his life. His death is long in overtaking him, even after the fatal stab on being stranded. For some minutes he lies still in a dying trance, from which he awakens to die in earnest. It is to be hoped the final struggles are involuntary and unattended by pain; but however this may be, it is as well to avoid his tail during those last moments. Several fishermen were banged on the back from their carelessness, and one young fellow was rolled over and stunned.

The operation of flenching lasted the whole night. A good fat

Ca'ing whale will yield a barrel of oil, and measure 20 ft. long, exclusive of the tail, and 10 ft. in girth. The breadth of the tail of a full-sized specimen, as I found by several measurements, is 5 ft., and that of the dorsal fin 28 in.

I learned a great deal about whales, both as to the right of capture and also their natural history, but on both these subjects I afterwards compared my notes with the works of the best authorities, remembering that the powerful imagination of fishermen has rendered them a little unreliable in reference to the monsters of the deep, especially in Shetland waters. In the case of whales caught in *pleine mer*, where poor fishermen seldom catch them, they belong entirely to the captors, but when they are driven ashore, the owner of the land adjoining the beach takes a share. This is a grievance. He formerly took one half of the proceeds of a day's work such as I have described. This was a terrible grievance, and a constant source of disputes, until at last a question was raised in the Court of Session, and the landlord's future share was adjudged to be one third. The old laws by which the landlord claims part of what is taken from the deep by means of the skill and labour of the tenant are the ancient Forest Laws of England. According to those ancient ordinances, all 'great whales' which could not be drawn on a wain by six oxen belonged to the king; but in Shetland, the king's donatory in after times claimed a share even of the small fry of the whale tribe.

The Royal right had never been actually exercised in the case of whales that were forced ashore by the exertions and industry of the people, and the claim to a share both of big and small whales by the donary, and afterwards by his deputy, and by the landlords, was finally established by use and wont, and not by statute law.

The full title of the Ca'ing whale is *Globicephalus deductor*, or Round-Head Leader. His globular head and the want of a snout—that mark of energy in well-developed faces—are defects which give this whale a particularly foolish appearance. There can be no doubt of his occasional folly when we find him on the shallows. What makes him such a fool I know not, but what makes him look so exceedingly unwise is the projection of the upper jaw, the absence of nose, the roundness of the face, and the opening of the foolish mouth a little below the middle of the globe, about midway between its equator and the antarctic circle. The circumstances render Globy's personal appearance ridiculous. He looks altogether the simpleton he is. His under chops open and shut like the lower part of a pair of bellows, the upper structure being a fixture. The jaw is not provided with whalebone for the purpose of straining the small fry that swarm in the voes and straits of the islands, but with teeth for mashing them up. There is a blow-hole at the back of the head, and a large dorsal fin which distinguishes the Ca'ing whale at a glance from the Bottle-nose. I often saw booby Globy moving steadily along after a herring boat, with his back fin above the surface like a cut-water. Bottle-nose can be seen sometimes rolling about at the surface as if intoxicated, and it is easy to see that he has only a tail and side fins to exhibit on such occasions. Like other sheep, booby sometimes strays, and is occasionally seen in the Mediterranean; but his usual haunts are between 56° and 66° N. Lat. Over his extensive fish pastures the inoffensive beast ranges at will, and becomes so fat in the capital sea pasturage of Shetland that the teats of the females, which are larger than those of cows, are very often quite concealed and packed away in blubber. The skin is soft and silken, and there are usually about three inches of blubber on the back. Ca'ing whales cry easily, and have decidedly the softest heads and hearts of all the Cetacea, and the tenderest maternal and mutual affections, with such a strong inclination to assist companions in distress, that when they hear a stranded cub crying, or 'ca'ing,' having run aground or got into some other scrape, the parents and relations immediately come bustling up without either plan or reflection, and the result very often is that all the family rush into a predicament, and lose their lives while showing their sympathy.

Another peculiarity of the Shetland whale is his loyalty to the leader of the drove. He owes the name Deductor to that peculiar trait of electing a leader, or sort of emperor, whom he follows for weal or woe, as we have already seen. No doubt there are advantages in thus selecting an experienced member of the drove in preference to each whale acting on his own responsibility. The machinery of a parliamentary form of government might prove too slow in cases where the safety of the drove depended upon promptitude; and on the other hand the autocratic system proves terribly defective when the unfortunate Deductor loses his head and leads the drove upon the sands.

The business of fishing in Shetland was at length wrested from the Dutch, in whose hands it long remained, and on their retiring from the trade early in the last century the land proprietors themselves turned fish-curers.

According to the report to the Truck Commission, which is more reliable than my own information derived from casual inquiries, home or summer fishing includes the fishing for ling, cod, tusk and saith. It is prosecuted in open boats, usually of six oars, from about the 20th of May to the 12th of August. The 'Haaf fishery'—from *haaf*, 'the deep sea'—includes the taking of cod, ling and tusk, ling being by far the most important part of the produce. Cod fishing, called 'Faröe fishing,' is prosecuted in the vicinity of the Faröe

Islands, and in autumn, as far north as Iceland. There is also 'home cod fishing' on banks off the south-west of Shetland, carried on in smacks of small size, besides one other branch of this adventurous trade, which is the 'Winter fishing.' This last-named, and most hazardous, pursuit is carried on in small four-oared boats belonging to the hardy adventurers who engage, always at their own charge and risk of life and outfit, in this kind of fishing. A toast of Shetland, when the fisher-farmers meet at an annual feast to inaugurate the grey fish season, is, 'May the Lord open the mouth of the grey fish, and hauld His hand about the corn.'

The largest of the fishing stations is at Feideland. A rocky isthmus at the northern end of Mainland separates the Atlantic from Yell Sound, and beyond it is a terminal peninsula called the Ness of Feideland. A cluster of 'stacks,' or high rocks, stands out at sea about a mile from the shore. The huts of the fishermen occupy numerous rows upon the isthmus, which is, in fact, a low storm-beach of pebbles rolled up by winds and waves. During many months in each year Feideland is deserted, till in spring its whole aspect changes —men arrive for the boats, beach-boys and women for splitting, washing, salting, spreading and drying the fish, and innumerable sea-gulls as attendant scavengers. Not less than thirty-one six-areens and two four-areens were here in a recent year.

'Old Wick,' writing to the *Field*, says:—

> 'Each curer's boys have a hut to themselves, while the storekeepers sleep in the booths belonging to their respective employers. The fishermen and boys go home every Saturday—some to Yell, some to Delting, and a few to other parts of Northmaven for the "helie," as they term the interval between sunset on Saturday and sunrise on Monday—a period during which, by the old country Acts, all Shetlanders were forbidden to fish, travel by sea or land, or be in any way engaged on secular matters. Up to within the last forty years or so, almost all the boats used in Shetland were imported from Norway in boards ready for putting together. At the present day, with the exception of a few big boats, they are all built in Shetland, though the model used is, with very little, if any, alteration, still the same—that of the old Norwegian jawl.'

These 'sixterns,' as they are called, from the number of their oars, are slimly built, about 6½ ft. broad, 3 ft. deep, with from 20 ft. to 21 ft. of keel. They are manned by six men, and carry a lug-sail containing not less than 60 yards of canvas. But in spite of the skill with which these boats were managed, the great storm of July 20th, 1881, almost entirely destroyed the Shetland fleet of fishing boats, and the 'sixterns' are being rapidly superseded by decked boats of larger size. In 1877 there were only two decked boats belonging to the islands, in 1882 there were one hundred and eighty-three.

'Old Wick' describes with an angler's zest the method of fishing pursued in the 'sixterns.' The number of baited hooks is eleven to each 'bought,' and there are from nine to twenty boughts.

The cost of an entire 'fleet' is £17 10s., which seems a small sum compared with the outlay on the fleets of other countries. The Shetland fleet, however, is a formidable engine of destruction in its way, and I have often seen the boats from the haaf unloading 35 cwt. of fish each. 'Old Wick' shows precisely how the catching is managed. The long line is sunk with stone, buoyed with corks, and baited with herring, haddock, halibut, mackerel, piltochs, conger, tush, cod, and ling. We are told by another adept that herring is the best of all bait when it can be procured, and is caught either in nets or with the bare white hooks on dandy lines worked up and down from a boat at rest, and so numerous are the fish sometimes that the sinker (½ lb. to 1 lb. lead) is stopped on the descent by the number striking at the same moment, and six hundred have been got between eight and ten o'clock in the evening.

Haddocks are caught on small long lines of five boughts, with ten score hooks laid in about twenty to sixty fathoms of water, and baited with limpets, cockles, or razor fish or mussels. One of the old country Acts ordained 'That none use mussels or other bait, but such as all or the most part of the fishers hath, under the pain of £10, and that none fish with haddock lines within voes from Beltane to Martinmas, or so long as they can draw haddocks on the hand lines, and that none take bate nor cut tang in another man's ebb, under the like pain of £10.' The banks or 'grounds' lie at all distances from the coast, the principal one at the Feideland haaf being about forty miles north-west from Feideland, though the boats are said sometimes to go as far as sixty miles off land, sinking Roeness Hill, before the line is completely set in 'the deep waters;' *i.e.*, 80 to 120 fathoms. Should the lines in foggy or misty weather get shot on certain 'long lanes,' or channels of sandy bottom, the fish taken are rendered worthless by the *Æga tridens*, or 'bee,' as it is termed in Northmaven, a small crustacean which, getting in through the gills in large numbers, eats away the inside of ling, tusk, and cod, and leaves the fishermen nothing but the skin and bone. Flat fish—such as skate and halibut—it is compelled to leave untouched, as these fish have the power of keeping their gill covers closed, which prevents the bee getting access to the interior of the fish.

The six-oared boats make two trips a week to the far haaf when the weather is good, starting from eight to ten in the morning on Monday and returning on Wednesday, and making another trip between Thursday and Saturday. The smaller boats going about half the distance, from ten to thirty miles, lay and haul their lines everyday. Ling, tusk, and cod are handed over to the curer; other sorts are retained for family consumption.

Among interesting novelties sometimes caught in the seas of Shetland are sharks and the king-fish, or opah: the former are fortunately of small size; the latter has been taken weighing 1½ cwt. Three tons of ling are a big fishing, thirty hundredweight is an average catch. A ling of 28 lbs. is a big fish: the average is 11 lbs.; 14 lbs. is a big tusk, the average being 4 lbs. Cod may weigh 28 lbs.; they average about 10 lbs. These fish will keep, if the weather is tolerably cool, from Saturday till Monday, but saith, or coal-fish, (*Gadus carbonarius*) must be put into pickle at once.

Omitting all further details relating to the industry of fishing carried out in Shetland, I shall only add that the Shetland management at sea is probably almost perfect. But in all that follows and much that precedes the catching and the drying of the fish, it is exceeding defective. So long as the Shetlander is self-reliant, as he is always at sea, his conduct is superb, but the moment he sets his foot on shore he becomes the tool of others, and, in hackneyed phrase, a hireling and serf. It is stated in the report by Mr. Guthrie (Nov. 4th, 1875), acting in Shetland as the Commissioner on Truck, that land proprietors are either directly concerned in Truck, or they let their lands to merchants who are either tacksmen, lessees, or middle men, having tenants under them; or lessees only of a fishing station, having a retail shop or store for goods of all kinds.

Factors are employed by the merchants at the various curing establishments near the haaf to receive and weigh the fish and enter the weight in a fish book, and to furnish the fishermen with supplies, such as meal, lines, and hooks. Each boat's crew delivers the whole of its fish to a particular merchant; that is, they fish for him as the tenants did originally for their landlord as a condition of holding their crofts. A boat is usually divided into six shares, each of the crew having one, and the proceeds of the fish, after deducting the price or hire of the boat and other expenses, for which the crew is responsible to the merchant, are also divided into six shares. In the balance-sheet, drawn up by the merchant at the end of the season, the debit against each fisherman consists of goods supplied from the store, cash advanced to him, or for rent, taxes, and other payments on his account, and is credited with the price of his fish at the current rate, and the price of any cattle or ponies sold by him to the merchant. His smaller farm produce, such as butter and eggs, are very often sold to the same merchant, and are paid for in goods, rarely in cash over the counter.

As the Commissioners observe in their Reports, a tacksman may appear liberal so far as the letter of the leases to the sub-tenants is concerned, but he holds them in complete subjection, nevertheless, by various unavowed modes of control. They mention, as an example one of the islands where one half the land is let to a company of merchants at the rent of £1,100, and in the sub-leases there is no expressed obligation either to fish for the merchants or to purchase goods at their store, but the reservation of peats and of the scathold binds the crofter-farmers hand and foot, and they must fish and fag for their masters, according to the conscience of the latter, or lose those two indispensables of Shetland life—firing, and food for cows and ponies.

At the outset of his inquiries, the Commissioner, Mr. Guthrie, met with a difficulty and complication connected with his subject which may very probably explain the inertness of the Government at that time in dealing with an acknowledged abuse. Mr. Guthrie declared in his Report that 'it is impossible to separate the question of Truck in Shetland from the land question : (1) because Truck, in the form in which it chiefly exists, has arisen out of the old relations between landlords and tenants, in the times when the landlords were the principal or the only purchasers and curers of fish ; and (2) because to a very material extent the relations between the fish-curers and the fishermen are still subservient and ancillary to the landlord's security for his rent.'

By way of alleviation the Commissioner suggested cash payment at short intervals for fish and hosiery, and a limitation of action upon debts ; but such patching of a rotten system, mixed up as it is with the land question, would not free the people from the trammels they are under. The Sheriff Clerk, on the contrary, when he was asked for remedies, promptly replied—'The merchants say that the reason for carrying out this system is, that the people would starve six months in the year if they did not make these advances. But I hold that to be utterly wrong. If the merchants advance them for two or three months, the tenants or common people supply capital to the merchants for the other eight months. They supply their fish, and produce, and cattle, and everything. I should certainly urge that it should be made penal to pay the like of these ignorant people *otherwise than in hard cash.*'

The witness then expressed the following opinions. He was asked—'You would extend the Truck Act to the Shetland fisheries?'

'Yes; and I would have a still more stringent Act.'

'Would you require a special Act for Shetland ?'

'Decidedly so, if you value the interests of 31,000 people.'

Mr. Guthrie's mild report contains the customary acknowledgments of the results of insecure tenure to which the country has been now accustomed for a hundred years, since the earliest declarations of Arthur Young. He says—'The present insecurity of tenure is not consistent either with the permanent interests of the land (in which the country still more than the landlord is concerned), or with the formation or maintenance of a race of independent and intelligent citizens.' He therefore recommends 'a warning of at least one year, and the recovery from the landlord, or succeeding tenant, of compensation for improvements by summary means.' 'Here too,' he adds, 'it may perhaps be said that legislation ought not to be of a local and exceptional character,' and he hopes that when the Land Tenancy Laws of Scotland are reformed 'Shetland will not be forgotten.'

Mr. Guthrie hardly felt himself entitled to propose the only remedial measures which could prove effective. 'I have not,' he informs the Board of Trade, 'thought myself at liberty to enter upon the land question in Shetland as a substantive part of the inquiry; but it is plain that the prevalence of Truck is due in no small degree to the habit of dependence, or submission, which the faulty relations between landlords and tenants have fostered.'

Fortunately for Shetland, its condition has very greatly improved since the period when Mr. Guthrie made his report. Tillage farming on a small scale could not possibly compete with that of the Scotch farmers, and of the improving lairds; and the result has been a large extension of pastoral farming and of sheep breeding on a large scale, with a considerable diminution of the population within the past ten years. The fishing industry has been most fortunately developed, so that the people are decidedly better off, and may now be said to be prospering. The number of boats engaged in that branch of fishing called the 'haaf,' commencing in April and continuing nearly four months, has largely increased; and the herring fishery has been prosecuted with great energy. In 1875, only 2,896 barrels of herrings were cured; the number has now reached 134,000 barrels. The herring season commences in June on the West side of the islands, and ends in July on the east side, where the principal fishing stations are at Lerwick, and in Yell and Unst: the season commences in August and ends in October.

Some of the more hazardous occupations of the Shetlanders have decreased since the extension of their native fisheries. The Faröe and Iceland cod fisheries have both become less popular, and the number of 'hands' that embarked for the Greenland fishing in 1882 was only three hundred; and in the same year, the Davis's Straits whale-fishing attracted only two hundred Shetlanders.

The prices paid for fresh fish by the curers have considerably advanced, and are now as follows: ling, per cwt., 8s. 6d.; cod, 7s. 6d.; tusk, 5s. 6d.; halibut, 10s., till May, then 6s. All these details may serve to explain the subsidence of complaints against the defective land system of Shetland. The statistics are all favourable, except the decrease of the population; and the material prosperity of the islands is believed to be secure, having been assured by the development of native industry by a most patient, energetic, law-abiding race—a hint for Ireland.

SPORTING GUNS.

As an article of sport the gun stands pre-eminent. Neither the rod nor the bow have now bestowed upon their production one half of the thought lavished upon gunnery: they, therefore, are more distant from perfection. An illuminated manuscript of the fifteenth century has for ornament the sketch of a grotesque figure firing a small hand-cannon at a barn-door cock. This caricature of a sportsman, and the accompanying directions referring to 'Y^e Gonne, and Howe to Use Itte,' is one of the earliest notices of the employment of firearms for sporting purposes.

The ancient guns preserved in our museums, with their clumsy worm-eaten stocks, ill-balanced barrels, and cumbrous attachments, seem wholly unfitted for sporting purposes. Nevertheless, guns were used in the chase as early as the fifteenth century. Wars on the Continent kept the gunmakers busy and fully employed in the perfecting of military weapons. In the intervals of peace the improvement of sporting arms was developed, and after the close of the Thirty Years' War special attention was given in Germany to the production of better balanced and more suitable weapons for sporting purposes.

YE GONNE, AND HOW TO USE ITTE.

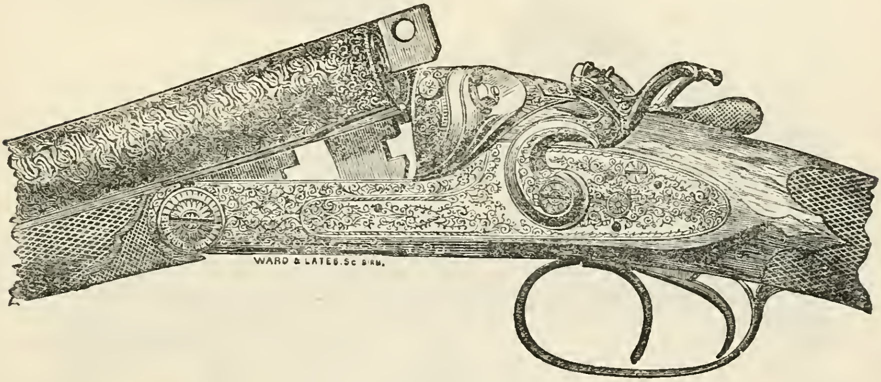
Towards the close of last century the English gunsmiths, by closer application and the more rapid improvement of the sporting shot-gun, gained for themselves a supremacy they have since retained.

To enumerate even the more noticeable points in the evolution of the perfected sporting gun of to-day would require a volume. As guns belonging to a past era, or quickly passing to the forgotten, are muzzle-loaders, flint and percussion, pinfire breech-loaders, and under-lever breech actions. The present period is a transient one. The central fire hammered breech-loader is more or less quickly giving place to 'hammerless guns,' whilst the gun of the future—the electric gun—is already struggling into existence.

To deal with the present. Of what is the sporting gun of to-day capable—its range and its effectiveness? Given seven pounds weight, and a shot-gun is to be produced that has a killing circle of forty inches in diameter, a range of eighty yards, with enough velocity imparted to its one-and-a-quarter ounce charge to penetrate any feathered game at that distance.

Given nine pounds, a double rifle that at 100 yards shall have a mean deviation of bullets not exceeding two inches, and with velocity and striking force sufficient to kill any of the *cervidæ* at 200 yards range.

These replies have been proved over and over again, but with the present methods of gun manufacture and knowledge of gunnery, are not likely to be anything but the highest estimate of a gun's power.

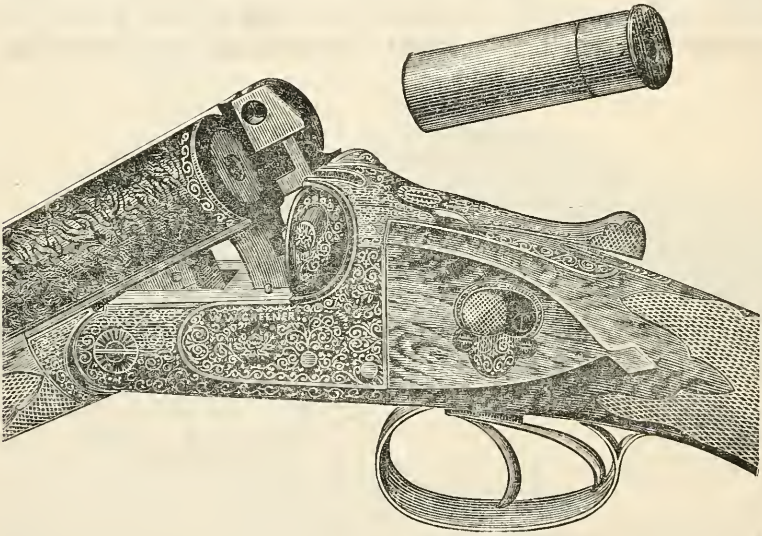

WARD & LATES.Sc BIRM.

SNAP TREBLE-WEDGE-FAST GUN.

Velocity is dependent upon the explosive, and cannot be increased by any inherent property of the weapon; all that gunmakers can do is to lessen the retardation as much as possible. Accuracy and range are dependent upon the rifling, so is close shooting upon the boring of shot-guns; and this latter quality has been brought to such perfection, that a first-class gunmaker can guarantee that an average of 85 per cent. of the pellets fired shall be within a 30-inch circle at forty yards.

Much is now done by automatical acting mechanism in the sporting gun that in older models requires special manipulation. An early step in this direction was the rebounding lock, the hammers after falling springing back to half-cock, so that the gun may be ready for opening. Now it is usual to have both locks automatically raised to full cock, either by a rebound, as in Purdey's system, or, as is more usual, by utilising the weight of the falling barrels. When loaded the holding down bolts are forced home by a spring, and the barrels thus firmly gripped to the breech action. The gun when fired automatically ejects its fired case. Self-acting safety-bolts are legion; but as they are automatic one way only, their advantage has been disputed; so also have been the advantages of metallic cases over paper; and these two questions, like many others connected with gunnery, are yet 'unproven.'

In the choice of a gun, the foremost consideration is to obtain the lightest weapon efficient to kill the game required. To get this, not only must the very best material be employed throughout, but also the best, strongest, and lightest mechanisms employed. For a breech action, there is none that combines lightness with strength in a greater degree than does W. W. Greene's Treble Wedge Fast System, 'the strongest extant.'* Good and well-shaped barrels are next in importance, as they give poise to the gun: no greater mistake can be made than to have a badly-balanced gun too heavy for the shooter.



EJECTING HAMMERLESS GUN.

A well-balanced, properly proportioned and carefully bored gun will give less recoil, and be lighter in the hand than an ill-balanced badly constructed one twenty ounces lighter.

Makers of reputation having mastered not only the details of building in proportion, but the theories of balistics, produce the lightest and safest of guns and the most efficient.

The cost of firearms is dependent more upon the care expended in accurately proportioning and fitting the various components than in the beauty of the finish: therefore the logical inference to be drawn is, to avoid light, cheap guns, or cheap small-bore guns, as they

* *Vide* 'The Gun and its Development'—p. 211.

require greater care in making; and if there is a limit to price, purchase a heavy weapon with plenty of metal in the barrels and breech action; if they were of best quality, of the proper form, and well fitted, it would not be requisite; but as this cannot be guaranteed in a 'cheapest breech-loader, with all latest improvements,' it is better to carry the extra metal than to run the risk of losing a limb. The advice of Polonius, 'Costly thy *gun* as thy purse can buy,' should be followed,—it is true economy.

W. W. GREENER.

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SCOTTISH ARBORICULTURAL SOCIETY.

ANNUAL GENERAL MEETING

THE thirtieth Annual General Meeting of the Scottish Arboricultural Society was held on Tuesday, 2nd October, in the class-room of the Royal Botanic Garden, Edinburgh. Professor Dickson, President, occupied the chair, and among those present were Dr. Cleghorn, of Stravithie; Messrs. J. M'Gregor, Ladywell; M. Dunn, Dalkeith; W. M'Corquodale, Scone; William H. Rider, 'FORESTRY,' London; James Welsh and William Welsh, Pilrig Nurseries; John Methven, Leith Walk Nurseries; James Gordon, Luss; A. Shearer, Landscape Gardener, Edinburgh; J. M'Laren, Hopetoun; James Kay, Bute; R. Baxter, Dalkeith; R. Lindsay, Curator Royal Botanic Garden; John Michie, Balmoral; John Ferguson, Forest Department, Madras; John Allan, Dalmeny Park; James Robertson, Panmure; Alexander Anderson, St. Fort, Dundee; John M'Lean, Touch; D. F. Mackenzie, Morton Hall; John T. M'Laren, Cavers; William Stewart, Dalhousie; Alexander M'Intosh, Forres; Charles Buchanan, Penicuik, &c.

NEW MEMBERS.

Upwards of fifty new members, including His Grace the Duke of Argyll, His Grace the Duke of Athole, the Marquis of Stafford, Viscount Stormont, the Master of Rollo, Sir John Forrest, Bart., of Comiston; Sir Henry B. Loch, Chief Commissioner of Woods and Forests; General Sir Arnold B. Kemball, K.C.B., K.C.S.I., and the Chairman of Epping Forest Committee, and Capt. Sprot of Garnkirk, were elected.

COUNCIL MINUTES.

The Secretary read the minutes of the Council meetings during the past year, which were approved, including two items adopted by the Society on the proposal of the President, viz., the contribution of £100 to the Guarantee Fund of the International Forestry Exhibition, and of £10 to Dr. Croumbie Brown, Haddington, towards the expenses of the publication of his 'History of Forestry in Great Britain.'

ELECTION OF OFFICE BEARERS.

Mr. M'Gregor, Ladywell, moved the election of the following list o office-bearers recommended by the Council, the motion being seconded by Mr. James Gordon, Luss, and carried by acclamation :—

President :—Hugh Cleghorn, M.D., F.R.S.E., of Stravithie, St. Andrews.

Vice-Presidents :— Robert Hutchison, F.R.S.E., of Carlowrie, Kirkliston ; Wm. M'Corquodale, Forester and Wood Surveyor, Scone, Perth ; The Right Hon. the Earl of Rosebery, Dalmeny Park, Edinburgh ; Alex. Dickson, M.D., F.R.S.E., Professor of Botany in the University of Edinburgh ; Malcolm Dunn, the Palace Gardens, Dalkeith.

Council :—Robert Baxter, Forester, Dalkeith Park, Dalkeith ; John Hutton Balfour, M.D., M.A., F.R.S.S.L. & E., *Emeritus* Professor of Botany, Edinburgh ; John Anderson (of Messrs. Dickson & Turnbull), Nurseryman and Seedsman, Perth ; John Lamont (of Messrs. Lamont & Son), The Glen Nurseries, Musselburgh ; John M'Gregor, Forester, Ladywell, Dunkeld ; James Robertson, Forester, Panmure, Carnoustie ; Charles S. France, Factor, Scone, Perth ; James Gordon, Forester, Rossdhu, Luss, Dumbartonshire ; John M'Laren, Forester, Hopetoun, South Queensferry ; D. F. Mackenzie, Factor, Morton Hall, Liberton, Edinburgh ; Robert Lindsay, Curator Royal Botanic Garden, Edinburgh ; James Alexander (of Messrs. Dickson & Co.), Nurseryman and Seedsman, Edinburgh ; John Methven (of Messrs. Thomas Methven & Sons), Nurseryman and Seedsman, Edinburgh ; D. Scott, Wood Manager, Darnaway Castle, Forres ; Daniel Dewar, Forester, Beaufort Castle, Beauly.

Secretary and Treasurer :—John M'Laren, jun., 5, St. Andrew Square, Edinburgh.

Auditor :—John Ord Mackenzie, of Dolphinton, W.S., 9, Hill Street, Edinburgh.

President's Address.

Professor Dickson having vacated the chair, the new President (Dr. Cleghorn) took it amid applause and spoke as follows.

Only a few days ago I was informed of the intention of the Council to nominate me as President-elect of this Society, and I greatly esteem the honour you have conferred upon me, particularly as I occupied the same distinguished position ten years ago. And I consider it no small honour to succeed in this presidential chair the learned and amiable keeper of the Royal Botanic Garden, Professor Dickson, whose many public engagements prevent his presiding over us for another year as had been proposed.

The history of the Scottish Aboricultural Society has been one of steady progress throughout its course. The number of its members has risen year by year, the attendance at its meetings and excursions is increasing, and it now holds an important place among our national institutions.

This day there has been a large increase of members, including some of the greatest names in Britain. For example, His Grace the Duke of Argyll is not only a large planter of trees himself, but when Secretary of State for India he promoted a wise system of forest administration. The Duke of Athole is the largest proprietor of woods in Scotland, and is the bearer of a name which will ever be remembered in connection with the introduction of the Larch, and other great arboricultural experiments. And among others who have joined us are the Marquis of Stafford, the Lord Stormont, Sir Arnold Kemball, Sir Henry Loch, Chief Commissioner of Woods and Forests, and a large contingent of the most intelligent foresters of the country.

These facts, however gratifying to us, are not the only signs that forestry is making progress in Britain, and to some of these tokens of vitality and growing interest I propose now shortly to direct your attention.

Many of you are aware that for some years there have been two British journals devoted to the discussion of forest matters, one published monthly in London, called the *Journal of Forestry and Estate Management*, and the other printed in India, also monthly, under the title of *The Indian Forester*. The latter contains translations of continental works of forestry, and notes of general interest on forestry, natural history and horticulture, besides facts specially relating to India. That which was the *Journal of Forestry* commences a new series, and now appears as *Forestry: a Magazine for the Country*, enlarged to eighty pages, and we may say of it, under the care of Mr. Heath, as of the Indian journal, edited by Mr. W. R. Fisher, that we wish the new series every success. Both periodicals are procurable from our friend Mr. Rider, of Bartholomew Close, who has travelled from London, to attend our anniversary meeting. Another important serial, published by this enterprising firm, Messrs. Rider and Son, is the *Timber Trades Journal and Sawmill Advertiser*, a journal not so much for the forester and grower of timber as for those who have timber to dispose of, or for those who wish to buy. It is the recognised organ of the timber trade, and in its pages are recorded the fluctuations of the timber market and their cause, financial matter which affects the pocket of us all.

Here I may mention a singular fact. It appears from a correspondent in 'FORESTRY' for September, p. 385, that on most of the railways of this country the rates are in favour of foreign timber. We learn that timber was actually conveyed from Liverpool to Birmingham at the rate of $\frac{15}{17}$d. per ton per mile, while home-grown timber from Addlestrop to Birmingham was charged $3\frac{1}{8}$d. per ton per mile. The only explanation offered is, that foreign timber being in planks or battens, is less hurtful to rolling stock than heavy logs of oak or ash, which are not so easily transported; but this does not warrant so great a difference of rate. This difference arises from there being two systems of charging, one by weight, and the other by cubical contents, and these systems ought to be assimilated. One of the most remarkable instances of this discrepancy is in the case of British pit props, which are being rapidly superseded by Norwegian and Swedish timber, owing to the low rates at which it can be imported.

A similar remark may be made regarding the inequalities of carriage for British and foreign grown grain. A like undue burden lay not long ago on home breeders of stock for which a higher rate of freight was charged than for imported animals; but that inequality has, I believe, been removed by the Board of Trade. It is hard on the producer of timber grown in this country that, in addition to other obstacles to his sucess, unequal rates of carriage should be charged; and a representation from this Society to the proper quarter, that the rates should be equalized, might be followed by good results.

There is not yet any marked progress to report as regards arrangements for opening a School of Forestry in this country, but it is evident that our efforts in this direction have not been in vain, for on 2nd August last Sir John Lubbock, Bart., M.P., the distinguished President of the Linnean Society, brought the matter before the House of Commons, when the vote for the Office of Woods and Forests came on for discussion. He stated that the highest authorities had expressed a very strong opinion in favour of the establishment of a Forest School, and pointed out in forcible language the loss which the present system entailed upon our landowners. Mr. Courtenay, Secretary of the Treasury, acknowledged the value of Sir J. Lubbock's suggestions, and promised that the subject should not be lost sight of. Here the matter rests for the present.

Amongst recent works on Arboriculture, I may refer to the 'Elements of Sylviculture,' lately published by W. Rider and Son, a short treatise on the scientific cultivation of the Oak and other Hardwood Trees, translated from the French of Bagneris, by two Indian Forest officers, Messrs. Fernandez and Smythies. Although the author's experience was drawn chiefly from French woods, the same treatment of trees is applicable in other countries, and in this little volume the results are presented in a remarkably concise and clear manner. Only a few French terms remain, for which there are no English equivalents, and no one who wishes a good practical Forest manual need shrink from acquiring it because this book was written originally in French. It has been favourably received in this country, and is now used as a text-book in the Agricultural College, Cirencester. We hope that we shall soon be put in possession of a translation of an equally good German treatise on Forestry.

'The Organisation and Valuation of Forests on the Continental System in Theory and Practice,' by J. L. L. Macgregor, 8vo., pp. 313, London, 1883, is a useful work divided into two parts, one treating of General Principles, the other of the Survey and Examination of Forests with the application of general rules to their management. This book contains many formulæ for valuing rents, and the yield of forests, concluding with useful tables showing the cubic contents and basal area of logs and cylinders of given diameter.

Passing from our own country to the Colonies, we observe that attention is being given to the timber resources of different governments in Australia, all we believe with a view to maintain or even increase the available supplies. Evidence of this is afforded by the publication of a report on the forest resources of Western Australia by the indefatigable Baron Ferd. von Mueller, Government Botanist of the Colony; also by the appearance of the first part of the 'Forest Flora of South Australia' by one of our own members, Mr. John E. Brown (son of Robert Brown, author of 'THE FORESTER,') Conservator of Forests, Adelaide. He has forwarded to us a treatise, which is devoted to the description and illustration of the trees of that colony. The illustrations are in chromo-lithography, and are of the natural size. He delineates carefully the characteristics of the bark, which is a novel feature and of much importance. These official works prove that progress has been made in establishing Forest Administration in the great Australian Continent.

Again in America a new movement has been initiated, and the American Forestry Congress held two meetings (in 1882), one at Cincinnatti in the States and the other at Montreal in Canada. The abstract of the papers read shows that a general interest has been awakened in America, and that many intelligent members were gathered together at the Congress.

The American *Journal of Forestry*, edited by Professor Hough, contains some good matter, chiefly of interest in America. There are some pleasing notes of Travels in Norway, by Dr. Hough, who was with us last year. I observe that he has retired from his official position.

You have no doubt all heard that it is proposed to hold, next summer, an International Exhibition of Forestry, in Edinburgh. The preliminary arrangements have been made. It is under the patronage of Her Majesty the Queen, and aided by the personal exertions of our former President, the Marquis of Lothian, the Executive Committee now possess a Guarantee Fund of £3,475, which is being added to every day. The Classified List of Exhibits embraces a wide range—everything connected with or illustrative of the Forest Products of the World. The principal riches of many countries consists largely of Forest produce, raw or manufactured.

We hope to have samples of timber and other forest produce from the pine regions of Europe and America, the Teak, Sandalwood and Deodar of our Eastern empire, and the Eucalyptus and Acacia of Australia. A great variety of useful woods will be shown by the British Colonies. Many collections of forest implements and apparatus will be sent by the various Continental Forest Schools. We hope to derive instruction from the models and appliances used in France Germany, Italy and Austria, and benefit by the experience which other nations have acquired ; and perhaps we may be able to communicate something to the visitors who come tc see our Exhibition. Much useful information will be circulated, trade will be stimulated, and we look for personal intercourse with many timber merchants and craftsmen from the different ports of the Baltic, from Russia, Germany, Norway, and other countries. We shall have representatives from the Continental forests, and from the Forest Schools, and among these, more or less distinguished as they will be, I hope we shall have a visit from one of our own honorary members, and who is acquainted with many of our Scottish Foresters : I mean Dr. Brandis, who has lately retired from Government service, after being for nineteen years Inspector-General of Forests in India.

Our Society is pledged to take a special interest in the undertaking, but there will also be need for individual effort in order to make the Exhibition successful. And I would have each one of you look round his own sphere of duty, and ask himself—'What can I do to help?' Above all, I hope that as many of you as can possibly manage it, will make a point of being present at the Exhibition, that you may find out how large the world is, and how small a part of it this beautiful little island covers.

The list of special prizes to be offered has not yet been completed, but there is reason to believe that they will be numerous, and framed upon a very liberal scale.

Mr. Dunn moved a vote of thanks to the President for the able and comprehensive address to which they had just listened. Dr. Cleghorn had risen from a sick bed to come there, accept office, and do what he could to keep the Scottish Arboricultural Society before the world. They were pleased to see him in the Presidential chair once more, and long might he live to honour the Society, and advance the cause of Arboriculture. The address was a valuable one, and ought to appear in full in the transactions.

The motion was unanimously adopted, as was also a vote of thanks to Professor Dickson, the retiring President, moved by Mr. Dunn, and formally conveyed to the Professor by the President.

TREASURER'S STATEMENT.

The Secretary and Treasurer (Mr. John M'Laren, jun.) submitted the financial statement for the past year :—

It showed that the charge was £331 9s. 1d., of which there were £122 7s. subscriptions ; £24 3s. life memberships ; advertisements, £28 13s. ; drawn from capital account, £100. The discharge was £330 12s. 7d., of which £28 15s. 2d. was due to treasurer on last account ; £9 was for prizes ; £197 12s. 7d. for transactions, &c., and Secretary and treasurer's salary, £40. There was a balance in hand of 16s. 6d. The funds of the Society amounted to £363 16s. 2d. including sinking fund of £327 5s.

Essay Competition.

The President submitted the report of the judges on the Essays and Exhibits sent in for competition. In doing so, he referred to the loss the Society had sustained in the death of Mr. Sadler, late Curator of the Botanic Gardens. Last year they had been called upon to lament the removal of a wise counsellor—Mr. Gorrie,—and in his room Mr. Sadler was appointed to act as judge. But he, too, in the prime of life had been cut off. The Society had been the recipient of much assistance from Mr. Sadler in its young days, when it was not so prosperous as now. When Mr. Sadler died so unexpectedly the Council appointed Mr. Baxter, Dalkeith, to act as a judge in concert with Mr. Dunn and himself. Ten essays had been sent in competition, being three more than last year, and, taken as a whole, there was an improvement in them. The awards were as follows :—

Class I.

On the After-growth of Hardwood and Coniferous Tree Stumps (with Diagrams and Specimens). Second silver medal and £2. Robert Couper, assistant forester, Scone, Perth.

On the Cause of the Spruce Disease in Scotland during Recent Years (with Diagrams and Specimens). Second silver medal. John M'Lean, forester, Touch Estate, Stirling.

On Scottish Timber and Its Uses. First silver medal. D. F. Mackenzie, forester, Morton Hall, Liberton.

On Scottish Timber and Its Uses. Grigor's 'Arboriculture.' D. Clark, forester, Elie House, Fife.

On Forest Trees of Recent Introduction, and Ornamental Trees which might be Cultivated in Scotland. First silver medal. John M'Laren, Forester, Hopetoun House, South Queensferry.

On the Ash Bark Beetle, and the best method of getting rid of it. Second silver medal. Angus Macintosh, forester, Llanerch, Llannelly, South Wales.

On the Peeling and Harvesting of British Bark for Tanning. Grigor's 'Arboriculture.' Andrew Scott, assistant forester, Fowlis Wester, Crieff.

On the Different Methods of Seasoning Timber. Second silver medal. Wm. Harrower, forester, Cahir, Tipperary, Ireland.

On the Comparative Value of the Different Timber Trees grown for profit in Great Britain. Prize of £5 5s., given by Mr. Alex. Mackenzie, Superintendent of Epping Forest. D. F. Mackenzie, Morton Hall, Liberton.

Class II. (*Assistant Foresters only*).

On the Formation of Plantations. Grigor's 'Arboriculture.' A. Macdonald Grant, assistant forester, Hopetoun.

Miscellaneous.

Collection of Woods in Design as an Artistic Table. Gold medal. D. F. Mackenzie, Morton Hall, Liberton.

Rustic Seat. Prize, £1 1s., John Potter, forester, Dundas Castle, South, Queensferry.

Dendrometer. Prize, first silver medal. D. F. Mackenzie, Morton Hall, Liberton.

It should be stated that the table for which the gold medal was awarded to Mr. Mackenzie is a beautiful piece of inlaid work, the different woods being placed in in geometric designs and arranged with considerable skill. No fewer than sixty different species of wood, and 768 pieces, were employed in making the table, and it took three years to collect the specimens on the Murthly Estate, Perthshire, where they were all grown.

Mr. Dunn wished to add a few words of encouragement to the essayists. He was very glad, indeed, to see the increased number of essays, and he must say that the quality had also improved. It did great credit to the men who had undertaken the hard work of getting up the valuable information contained in the papers. There were hundreds of young foresters in the country who were eligible to compete, and he hoped that they would come out stronger in the future than they had hitherto done. They need not mind how indifferently or plainly they wrote; what the judges wanted was originality of idea and usefulness in the papers. If they were first-class essayists, they would not be working as assistant foresters. He was glad to think that they were to retain the services of Dr. Cleghorn, who edited the 'Transactions' in the most careful and judicious manner.

On the motion of Mr. Hutchison, Dr. Cleghorn, Mr. Dunn, and Mr. Baxter were elected judges for next year.

A short adjournment was made to the Royal Botanic Gardens, where Mr. Mackenzie's and Mr. Kay's Dendrometers were tested in measuring the heights of various trees, and both were found to work with accuracy.

A Royal Charter for the Society, and the Proposed International Forestry Exhibition.

Mr. Hutchison, convener of the committee as to the obtaining of a Royal Charter, said that they had little to report. The position of the Society would no doubt be greatly improved were they in possession of a Royal Charter, but in the meantime he believed that much benefit would accrue to the Society from the International Exhibition of Forestry which was to be held next year in Edinburgh. The prospects of the Exhibition were highly gratifying. The list of patrons was large and influential. Their friend Sir Richard Temple, had expressed his warm interest in the Exhibition, and had become a contributor to the guarantee fund. He hoped they would have Sir Richard as one of the evening lecturers when the Exhibition was open. The Exhibition was assuming much wider proportions than was originally contemplated, and it probably would be the prelude to a series of exhibitions of the industries of Scotland, from which Edinburgh would derive great benefit. It was the interest, therefore, of the City of Edinburgh to secure for the Exhibition the very best site procurable. In his own mind he had all along had the idea that there was only one site suitable for such an international display, and that was West Princes Street Gardens and the Castle slopes. That enclosure could be utilised without in the least destroying its amenity, or interfering with the trees. What he proposed was, that if the Lord-

Provost and magistrates granted the use of the gardens for two or three months the Committee should erect in different parts of the gardens buildings of a handsome description, like Swiss châlets, and place the exhibits in these buildings. One court might be set apart for Great Britain, another for Canada, another the United States, another Australia, and so on for all the countries represented, while they could place the live specimens on the slopes of the Castle on the north side of the Esplanade. If that were done they would secure such an Exhibition as no other city in the kingdom could rival. Then, with the electric light, which would illuminate the whole gardens, and, with military music, they could have evening promenades. Of course, when the Exhibition closed the buildings would have to be taken down, and the gardens restored, but the buildings could be re-erected elsewhere for exhibitions of the manufacturing industries of Scotland, which might impart a great impetus to the industrial art of the country.

EDUCATION.

Mr. Dunn said that in the matter of the Education of young Foresters, the Council had done little directly. Indirectly, however, in promoting the International Exhibition of Forestry, they expected that educational interests would be vastly promoted. He moved that the Council be instructed to continue to do their best in advancing the educational cause.

Mr. Hutchison said that the Executive Committee of the Exhibition had not lost sight of the education and special interests of Foresters. They had provided a special class for objects relating to the social and economical condition of Foresters, who had it in their own hands to make that class interesting and instructive. The principal object of introducing this section into the programme was to improve the condition of Foresters, both at home and in the temporary erections in the woods.

Mr. Rider would like, in relation to this matter, to make a suggestion to the Society and to the Executive Committee of the Exhibition. It was that they should undertake the publication of a series—either large or small—of handbooks on subjects connected with Forestry. These books could be brought out in a cheap form, and he had no doubt they would have a very important effect upon the science and art of Forestry. The idea was suggested to him by what had been done in connection with the recent Fisheries Exhibition in London. The Council of that Exhibition had published, at the small price of a shilling, a series of little books bearing on the subject of Fish and Fisheries. If the Committee of the Forestry Exhibition could be induced to adopt the idea, he thought there would be no difficulty in finding suitable writers. The books would not only have a large sale, but would help materially the cause of Forest education.

Mr. Dunn's motion having been adopted, the subject dropped.

PRESENTATIONS TO THE SOCIETY.

The Secretary intimated that the following presentations had been made to the Society's Library and Museum :—'Manual of Land Tenure and Forest Administration,' and 'Manual of Jurisprudence for Forest Officers,' by Mr. Baden-Powell; 'The Woods, Forests, and Estates of Perthshire,' by Mr. Thomas Hunter, editor of the *Perthshire Constitutional;* 'Forty-two Sections of Canadian Woods,' by Mr. William Little, Montreal; 'An Album containing forty different Woods, each Wood cut in three different ways,' by Mr. Wilmers-dorffer, 72, Finsbury Pavement, London.

The thanks of the Society were accorded to the respective donors.

The Best Method of Utilising the Society's Excursions.

Mr. W. M'Corquodale, Scone, opened the discussion on this subject. He said:—

This subject, the discussion of which I am requested to open at this meeting, is of very considerable importance. Hitherto, the principal aim of the excursionists has been to visit and devote their chief attention to th Ornamental Department, making measurements of gigantic trees, and taking notes of finest specimens of the newer conifers, &c., but overlooking almost entirely a department of Forestry that is of far more intrinsic value to the practical Forester, and to the nation, viz., the plantations proper, comprising all the ordinary kinds of timber, and at all the various stages of growth. It appears to me that the excursionists, in so doing, have been committing a serious error, and I give the following as some of my reasons :—First, because the ornamental is altogether a secondary element in the Science of Forestry. Its relative importance to the great question how the growth of useful and profitable woodlands may be best promoted is comparatively trifling. Second, because, generally speaking, Forestry as a science recognises the cultivation of large plantations of marketable timber as its proper and legitimate sphere. For these, and other reasons, I would respectfully suggest that, in all future excursions, the members of the Society keep mainly in view the examination of the general plantations over the estates which they visit; and I would indicate the following points as of first importance to be considered, viz., the conditions of soils, climate, exposure, &c.; the adaptation of the classes of trees best suited for the various soils, and the system of management in practice in the several cases. It is only in this way that the observations made at these excursions can become of value for the future, and that the science of Forestry can be materially advanced. At the same time, I do not urge the utter exclusion of the ornamental department from the attention of the excursionists. On the contrary, I hold that this department is calculated to prove both instructive and enjoyable, provided it be used as an auxiliary, and not a monopoly, as I fear it has been in the past. Take the previous excursions as an illustration of my contention. The first excursion of the Society was to the estates of Scone and Lynedoch, when I made it a point to conduct the party over young Fir plantations, and hardwood plantations, as well as over what might be called the ornamental department. The following year at Dunkeld, Mr. M'Gregor did the same thing. The last excursion to Crieff district occupied two days, when six estates were visited; and in consequence of undertaking too much, the visit to each estate was hurried over in an unsatisfactory manner. It might be advisable that the excursion in future be confined to one day only; that a large wooded estate be selected, where a good system of management has been adopted for many years, and where ample scope may be had for making minute and careful inspection of both Fir and hardwood plantations, as well as ornamental sections. The chief attention of the excursionists, however, should be given to the discovery of the kinds of trees that, taking soil, situation, and other natural circumstances into consideration, are most likely to prove the most remunerative plantation trees: to questions of fencing, planting, landscape forestry, &c. I trust that other members present will offer their opinions on this important subject, in order that these excursions be made as interesting and instructive as possible.

Mr. Michie, Balmoral, thought that the excursions ought to be held at the same time as the general business meeting; that there ought to be only one grand meeting of the Society yearly, and that the excursion ought to take place before the business meeting. The latter would enable the members to become better acquainted with each other, and they would be able to discuss in twos and threes what they had seen, so as to be able to speak more freely afterwards in regular debate. Further, he did not think there was any necessity for the Society always holding its meetings in Edinburgh. A hall might be procured in the district which the Society visited, where the meetings could be held. Other Societies followed this plan. The members of the Society were scattered all over the country, so that this method would give a periodical advantage to those in the locality visited. Some of the members had said last year that it was expedient the Society should have a local habitation, but that could only be for the goods and chattels of the Society, and for the library, to which members could repair when they happened to be in Edinburgh.

Mr. Baxter, Dalkeith, said his idea of an excursion was not merely an educational errand. When they went anywhere they went to enjoy themselves, but at the same time they derived benefit from the excursions. For instance, two years ago, in the North, they had seen a very interesting plantation of Scotch Fir growing where Larch had been. In every place that they visited there were generally some things they ought to see, and it was a great pity to find in the train coming home that they had missed it. There ought to be a guide thoroughly acquainted with the district and its peculiarities, from a forest point of view, who should conduct the whole party together.

Mr. Michie said that Foresters had not altogether the power of enjoying themselves in their own hands, and it would encourage proprietors if they were to show that they had benefited in a business sense from these excursions.

Mr. M'Corquodale said the excursions furnished the only opportunity which Foresters had of examining strange plantations, and of trying to edify themselves in some way by an inspection of the methods of Forestry practised on various estates. He did not think it was judicious in the party scattering themselves over a property; they should all hold together under one guide. Foresters were not very rife of money, and it would not do to throw away two or three pounds in a pic-nic which might be got quite as well at home. He knew the utility of such excursions if properly conducted, and he had no doubt that young Foresters were as anxious as he was to study the management of woods on other estates.

Mr. J. Kay said that the excursions had all along been very pleasurable, but it required a little arrangement to have the practical element drawn out.

Mr. J. Gordon, Luss, from practical experience, said that it was difficult to keep a large party well together in going through woods. He agreed that the Society should have a local habitation in Edinburgh, and only one meeting in the year, during which the business could be done. At the excursions the system of drainage, fencing, and planting should be explained, and the daily working of the estate detailed.

Mr. Dunn said that local meetings might be very well off if, for instance, they went to the Braemar district; but there were other localities with few Foresters, where it would be difficult to secure a quorum. Nothing but the expense had prevented the Council from making a trial of local meetings. It was to be hoped that they would have by another year suitable accommodation for the property of the Society, with an official who would attend to the room and receive members who wished to consult the library or inspect the museum. He did not quite agree with Mr. Michie about holding the annual meeting after the excursion. What he would suggest would be to fix on a day for the meeting, that on the next day the excursion should take place, when the working of the estate and the methods of Forestry could be closely gone into; then let those who could afford no more time go home, while the others could remain for another day or two getting up the details about everything likely to be useful to Foresters. It was not possible for a company, any more than for an individual, to see everything about a large estate, that ought to be seen, in one day. Speaking from their own knowledge, what could they do towards examining a wood of a few hundred acres in one day? and yet they were expected to inspect, with accuracy and profit, an estate of many square miles in a day! Everything considered, the members had done wonders at these excursions, and had acquired a vast fund of useful information. The discussions should take place on the evening of the first day's excursion. Referring to the copy of Mr. Hunter's 'Woods, Forests, and Estates of Perthshire' that day presented to the Society, he maintained that that splendid and, from an arborist's point of view, most interesting book was one of the best practical proofs of the value of the Society's excursions. But for these excursions, that book would never have been produced, for the author conceived the idea when attending the first excursion of the Society.

Mr. John Methven moved that the various suggestions should be remitted to the Council for consideration, which was agreed to.

The President, in summing up the discussion, said that his own feeling was that they had not taken full advantage of all the opportunities offered by these excursions. He had felt it himself. They had had some admirable guides—none more so than Mr. Gordon—and a great deal depended on that. The great object was to acquire accurate knowledge, and that could only be attained by systematic and careful observation. Any one who had gone an excursion with the late Sir Robert Christison must have noticed how very exact he was in all his observations. He entirely agreed with Mr. M'Corquodale's remark that they sometimes attempted too much; but much useful information may be derived from their various excursions.

Next Meeting.

On the motion of Mr. Dunn, it was remitted to the Council, to make arrangements for holding the next annual meeting during the Forestry Exhibition, and also to fix the locality for the next excursion.

Rooms for the Society.

Mr. John Methven moved that it be remitted to the Council to acquire a room for the Society's use in 5, St. Andrew Square.

Mr. M'Corquodale seconded, and it was agreed to.

Miscellaneous.

Mr. Hutchison called attention to the portion of a stem of a Larch exhibited in the room, and to a photograph of the tree where it stood in Dupplin Woods near Perth. This Larch had been struck by lightning, which had split the wood up into ribbons, each ribbon being the annual layer or year's growth.

Mr. M'Lean, Touch, exhibited the stem of a young Elm, whose top had been broken off some years before, but which continued to grow and make wood though entirely without leaves. His only explanation was that the roots of the stump had got inarched with the roots of some other tree.

The specimens were inspected with much interest, as were also a beautiful collection of photographic tree studies, by Mr. Jackson, Perth.

A vote of thanks to Dr. Cleghorn for presiding brought the proceedings to a close.

The Dinner.

The annual dinner was afterwards held at the Waterloo Hotel—Mr. Robert Hutchison, of Carlowrie, Vice-President, in the chair. Dr. Cleghorn, President; Mr. W. M'Corquodale, Scone, Perth; and Mr. John M'Gregor, Ladywell, officiated as croupiers, and there was a good attendance of members.

EXCURSION TO ETTRICK FOREST.

THE autumn excursion of the Scottish Arboricultural Society took place on October 3rd, to the estate of Bowhill, in Ettrick Forest, the property of the Duke of Buccleuch. Bowhill is situated in the county of Selkirk, on the banks of the Yarrow, classic as the birthplace of pastoral song and as the scene of many a struggle famous in the annals of Border chivalry. But from a forestal aspect, few districts in Scotland can afford the same deep interest to arboriculturists as the small county of Selkirk, a secluded corner of the southern highlands of Scotland. It was for centuries one of the principal hunting resorts of the Scottish kings, and was thus graphically described in ancient ballad:—

> 'Ettricke Foreste is a fair forest,
> In it grows many a semelie tree;
> There's hart, and hynd, and dae, and rae,
> And of a' wilde beastes great plentie.'

David I., William the Lion, Alexander II., Alexander III., James V., Mary Queen of Scots, and her unfortunate husband Darnley, all delighted in the sylvan sport which the mountains and dells, deep secluded woods and bosky braes afforded, and Queen Mary is said to have been the last Royal personage who rode through the 'Dowie dens o' Yarrow,' intent after the 'goodly hynd' or fleet hart. Tradition says that James V. converted great part of the forest into sheep-walks, and that from his reign began the decay of the fine natural woods which included so many 'semelie trees.' Ettrick Forest was specially famous for its excellent Oaks, as is proved by a reference to old chronicles. By a mandate of Edward I., in 1291, Simon Fresel, keeper of the forest of Selkirk, was ordered to give to certain noblemen and gentlemen of Scotland a number of stags (*Cervus*) and Oaks (*Quercus*). William, Bishop of St. Andrews, received 30 stags; Robert, Bishop of Glasgow, 20 stags and 60 Oaks (were these Oaks for the repair of the roof of the chancel of the cathedral of St. Mungo?) Brother Brian, two stags and four Oaks. Edward I. likewise granted to the monks of Melrose 40 Oaks from the same forest. The abbey of Kelso having been burned by the English, David II. granted permission to the monks to cut wood in Selkirk and Jedburgh forests for the repair of their religious house. The men of Ettrick Forest were conspicuous for their bravery at the battle of Flodden, and they received in recognition a grant of forest rights. The implacable resentment of the English reduced the burgh of Selkirk to ashes, and James V. made a grant of a thousand acres of the forest to the 'Souters'—the trees for the purpose of rebuilding their houses, and 'defence againis owre auld innemyis of Ingland.' In the accounts of the Lord High Treasurer of Scotland, *circa* 1496, a payment is entered 'Davide Achinsone to feel axtreis in the Forest, and to get cart lymmouris to bring hame quhelis fra Melrose.' About 1510 the king granted a lease of lands in Selkirkshire to Patrick Murray and held him bound to maintain the plantations of Oak and of all other trees necessary. In Elliot and

Scott's MS., *circa* 1649, in the Advocate's Library, Edinburgh, it is stated that at that date 'some places remained well furnished with pleasant and profitable woods, especially for building.' At the present day little remains, however, of the venerable woods which made Ettrick Forest so famous in ballad and the chronicles of venerie, and neither hart nor hynd find their wild haunts in any part of the district.

> 'Meek loveliness is round thee spread,
> A softness still and holy :
> The grace of forest charms decayed,
> And pastoral melancholy.'

But if the higher slopes and the summits of the hills are bare and lonely, by the loving enterprise of the proprietors of the vales of Yarrow and Ettrick, a new forest of varied charms is springing up in graceful beauty in the valleys, and adorning with a leafy shade the rising grounds which lead up to the heathery mountains. Much, very much, has been done during the past half century to add to the delights of Yarrow, by planting in accordance with the rules of landscape forestry. With so interesting a past and so instructive a present history, the Council had done well in selecting Ettrick Forest as the scene of the autumn excursion of the Scottish Arboricultural Society.

About thirty members assembled at the early hour of six o'clock on Wednesday morning, at the Waverley Station, Edinburgh. A special carriage was placed at their disposal, and though the morning was grey and not very promising, the party were in the blythest spirits. Selkirk was reached at half-past eight, and the party climbed up the steep braes of the ancient Royal burgh to the County Hotel, where breakfast was served and thoroughly enjoyed. Shortly after ten o'clock, a start was made in two open brakes for a run through Ettrick Forest by way of Philiphaugh, Newark, and Bowhill. Winding down the steep hill-side, on which Selkirk is built, a grand view is obtained of good part of the vales of Yarrow and Ettrick. On the north are the woods of Philiphaugh, to the west those of Bowhill, and north-eastward yet those of Sunderland Hall.

To the north and east are the woods of the Rink, Gala, Lindean, Faldonside and Abbotsford, while rising above this wealth of foliage in all its autumn glory. are the lofty rounded hills which impart such a peculiarly pastoral charm to much of the county. The good burgh of Selkirk is historically interesting. It rose under the shadow of the Royal Castle which the kings of Scotland built here as a hunting seat, and was favoured with repeated Royal charters granting privileges to its burgesses. When James IV. made his ill-fated inroad into England, which resulted in the disastrous battle of Flodden, 'the desperate valour of the citizens of Selkirk was eminently conspicuous to both armies.' Few returned tell the tale, but among them was a valiant weaver, who bore with him an English standard which he had captured. This same standard is yet carried annually by the corporation of weavers at the Common Riding. It was in reference to the fall of so many of the sons of the Forest at Flodden that the exquisitely pathetic ballad 'The Flowers of the Forest' was written.

> 'I've heard them lilting at the ewe-milking,
> Lasses a' lilting before dawn of day;
> But now they are moaning on the ilka green loaming,
> The flowers o' the forest are a' wede away.
>
> 'At e'en in the gloaming nae younkers are roaming
> 'Bout stacks with the lasses at bogle to play,
> But ilk maid sits dreary, lamenting her deary,—
> The flowers o' the forest are a' wede awae.
>
> 'Dool and wae for the order, sent our lads to the Border,
> The English for ance by guile wan the day;
> The flowers o' the forest that fought aye the foremost,
> The prime o' our land, are cauld in the clay.'

By this time we have reached the level of the Ettrick, and, crossing the river by a handsome stone bridge, turn to our left and bowl along a road which has few equals for its exquisite sylvan scenery. On either side of the valley rise gentle and anon precipitous slopes, which have been planted with admirable landscape effect, the belts now curving down to the water's edge, again sweeping up the hill face; there presenting a sea of foliage; here openings whose sun-kissed or stook-covered banks only impart a brighter glow to the general scheme of rich autumn colouring. On the high bank between Selkirk and the confluence of the Ettrick and Yarrow, are the stately woods of Haining, the property of Mr. Pringle-Pattison, with the pretty sylvan glen of Howden beyond. Further to the west and south is Oakwood Tower, a bosky place famous as the seat of the wizard Michael Scott, and afterwards of Wat Scott of Harden, and now the property of the lineal descendant of both these worthies—Lord Polwarth. The place is thus referred to in 'The Lay of the Last Minstrel:'—

> 'An aged knight to danger steeled,
> With many a moss-trooper came on:
> Wide lay his lands round Oakwood Tower,
> And wide round haunted Castle-Ower;
> High over Borthwick's roaring flood,
> His wood-embosomed mansion stood.'

About a couple of miles from the Royal burgh the main road was left and a divergence made into the grounds of Philiphaugh, associated in Scottish history with the name of the outlaw Murray, and now the property of his direct descendant, Sir John Murray. The Murrays are among the most ancient families of the Border, and were of power and consequence in the wars between Bruce and Baliol. In 1462 John Murray, of Falahill, became herd-keeper to the Queen of James II., who had received in dowry the lands of Deloraine (hence named from de-la-reine, 'belonging to the Queen') and others in Ettrick Forest. Thereafter he was appointed custos of the Royal hunting seat of Newark and overseer of the Royal forests. By a charter dated November 30, 1509, his grandson, John Murray, of Philiphaugh, was vested by James IV. with the dignity of heritable sheriff of Ettrick Forest, an office held by his descendants till the final abolition of such jurisdictions in the reign of George II., after the Great Rebellion. This is the foundation of the beautiful ballad, 'The Song of the Outlaw Murray.' The ballad sets out with the graphic description of Ettrick Forest already quoted, and of the Castle of the Murrays; then proceeds —

'Word is gane to our nobile king
In Edinburgh, where that he lay,
That there was an outlaw in Ettricke Foreste
Counted him nought, nor a' his courtrie gay.

'"I make a vowe," then the gude King said,
"Unto the man that deir bought me,
I'se either be king of Ettricke Foreste,
Or king of Scotlonde that outlaw sall be."'

PHILIPHAUGH.

The King then summons James Boyd, brother of the Earl of Arran:—

'"Wellcum, James Boyd,' said our nobile king,
"A message ye maun gang for me;
Ye maun hye to Ettricke Foreste,
To yon outlaw where bydeth he:

'"Ask him of whom he holdis his landis,
Or man, wha may his master be,
And desyre him cum, and be my man,
And hald of me yon Foreste frie."'

Should he refuse, Boyd was to threaten the Outlaw with conquest of his lands, the destruction of his castle and the death of himself, his lady, and his followers. Boyd proceeds to the Forest, interviews the Outlaw, who declares that he has won the Forest by his own hand, and will keep it against all the kings in Christentie. The Royal messenger returns and gives the king an account of his interview with Murray, whereupon the king gathers an army and sets out for Ettrick.

'The king was cuming through Caddon Ford,
And full five thousand men was he,
They saw the dark Foreste them before,
They thought it awsome for to see.'

The king gives another chance to Murray to submit, whereupon—

'"It stands me hard," the Outlaw said,
"Judge gif it stands na hard wi' me!
Wha reck not losing of mysell,
But a' my offspring after me.

NEWARK CASTLE, FROM THE RIVER.

"My merrey men's lives, my widowe's teirs--
There lies the pang that pinches me,
When I am straught on bluidie eard,
Yon castell will be right dreirie."'

Murray at last agrees to go before the king with some of his noble kinsfolk.

'When that they cam before the king,
They fell before him on their knee—
"Grant mercie, mercie, noble king,
E'en for His sake that dyed on trie."

'"Sicken like mercie sall ye haue,
On gallows ye sall hangit be!"
"Over God forbode!" quoth the Outlaw then,
"I hope your grace will bettir be!
Else ere ye come to Edinburgh port,
I trow thin guarded sall ye be.

This landis of Ettricke Foreste feir.
I wan them from the enemie ;
Like as I wan them, sae will I keep them
Contrair a' kingis in Christentie."
'All the nobilis the king about
Said, "Pitie it were to see him die."
"Yet grant me mercie, sovereign prince,
Extend your favour unto me.
I'll give thee the keys of my castell,
Wi' the blessing o' my gaye ladye,
Gin thou'lt mak me sheriffe of this Foreste,
And a' my offspring after me."
'"Wilt thou give me the keys of thy castell,
Wi' the blessing of thy gaye ladye ?
I'se mak thee sheriffe of Ettricke Foreste,
Surely, while upward grows the trie :
If you be not traitour to the king,
Forfaulted sall thou nevir be.
Now name thy landis where'er they lie,
And here I render them to thee.'
'"Fair Philiphaugh is mine by right,
And Lewinshope still mine sall be ;
Newark, Foulshiell, and Twinies baith,
My bow and arrow purchased me ;
And I have native steads to me,
The Newark Lee and Hangingshaw ;
I have mony steads in the Foreste shaw,
But them by name I dinna knaw."'

The king thereupon invested the Outlaw with all his lands, and the ballad ends—

'Wha ever heard, in ony times,
Sicken an outlaw in his degree,
Sick favour get befor a king
As did the Outlaw Murray of the Forest frie.'

Our guide, philosopher, and friend had just finished the recitation of this charming Border tale, when, rounding the shoulder of the Piper's Hill, we came to a nice open glade adorned with thriving specimens of Birch, Yew, Oak, Thorn, Scotch Fir, and Plane. About the centre of this glade was a rough pyramidal structure almost hidden by graceful curtains of ivy. A carved stone told the monument's own tale in the following inscription : 'Erected by Sir John Murray, Bart., to the memory of the Covenanters, who fought and gained the battle of Philiphaugh on 13th Sept., 1645.' The Covenanters were commanded by the renowned General David Leslie, and the forces raised in defence of the cause of Charles I. by Graham, Marquis of Montrose. Sir Walter Scott, in his introduction to the ballad of the Battle of Philiphaugh, contained in the 'Minstrelsy of the Scottish Border,' gives a graphic account of the battle. Advancing, we drive past the ancient mansion of Philiphaugh, beautifully situated on a terrace overlooking the Ettrick. A finer view it were hard to imagine than that to be had from this terrace. Every knoll and wooded slope has its tale of romantic or love adventure, and seen now in the mellowing sunshine of a bright October morning, the scene seems haunted by the very spirit of poetry. Drinking in with eye and ear the beauties of the landscape and their associations, one could thoroughly appreciate Sir Walter Scott's fine description :—

> 'When summer smiled on sweet Bowhill
> And July's eve, with balmy breath
> Waved the bluebells on Newark heath ;
> When throstles sung on Harehead Shaw,
> And corn was green on Carterhaugh ;
> And flourished broad, Black Andro's oak,
> The aged Harper's soul awoke !
> Then would he sing achievements high
> And circumstance of chivalry ;
> And Yarrow, as he rolled along,
> Bore burden to the minstrel's song.'

Bidding adieu to the exquisite grounds of Philiphaugh, the high road is regained near the fine bridge which crosses the Yarrow, and affords an entrance to Bowhill. Here the party was met by Mr. Martin, gamekeeper on the Bowhill Estate, who kindly acted as guide for the day, pointing out many interesting scenes and objects as we passed along. Continuing our course up the Yarrow, here hemmed in with graceful woods whose autumnal colouring lends an added charm, and through Harewood Glen on to Fouishiels—a ruinous cottage notable as the birthplace, in 1771, of Mungo Park, the famous African traveller. Broadmeadows is now reached, from which a splendid view of the whole of the vale of Yarrow, till it joins the Ettrick, is attained. Ahead are the 'Dowie Dens of Yarrow,' whose 'treeless scenery, pastoral loveliness, green colouring of the hillsides and slopes, deepened and darkened by the flitting clouds, and the mournful murmur of the stream, impart a feeling which harmonises with the wailing notes of the poet' :—

> 'Oh, that some minstrel's harp were nere
> To utter notes of gladness,
> And chase this silence from the air
> That fills the heart with sadness !'

Nearer at hand are the Hangingshaw Woods, and the sweeping plantations of Black Andro', while below are the sweet woods of Bowhill, the slopes of Philiphaugh adorned with glowing foliage, and the more open reaches of Oakwood Tower. Then, in the verse of Wordsworth :—

> 'That region left, the vale unfolds
> Rich groves of lofty stature,
> With Yarrow winding thro' the pomp
> Of cultivated Nature :
> And rising from those lofty groves,
> Behold a ruin hoary !
> The shattered front of Newark's Tower
> Renowned in Border story.'

Wheeling to the left and crossing 'Yarrow's stream' by the General's Bridge, the party soon found themselves in front of the stately ruined pile of Newark Castle, which, says Schetky, in his illustrations of 'The Lay of the Last Minstrel,'—

> 'Was built by James II. The Royal arms, with the unicorn, are engraved on a stone in the western side of the tower. There was a much more ancient castle in its immediate vicinity, called Auldwark, founded, it is said, by Alexander III. Both were designed for the Royal residence when the king was disposed to take his pleasure in the extensive forest of Ettrick. Various grants occur in the records of the Privy Seal, bestowing the keeping of the Castle of Newark upon different barons. . . . Upon the marriage of James IV. with Margaret, sister of Henry VIII., the Castle of Newark, with the whole Forest of Ettrick, was assigned to her as a part of her jointure lands. But of this she could make little advantage; for, after the death of her husband, she is found complaining heavily that Buccleuch had seized upon these lands. Indeed, the office of keeper was latterly held by the family of Buccleuch, and with so firm a grasp that, when the Forest of Ettrick was disparked, they obtained a grant of the Castle of Newark in property. . . . The Castle continued to be an occasional seat of the Buccleuch family for more than a century; and here it is said the Duchess of Monmouth and Buccleuch was brought up. For this reason, probably, Sir Walter Scott made it the scene in which the "Lay of the Last Minstrel" was recited in her presence and for her amusement.'

BOWHILL.

From Newark a compass was fetched to Bowhill, the modern Yarrow residence of the Duke of Buccleuch—the route taken being by the beautiful road along the banks of the Yarrow, known as the Duchess's Drive, from Anne, Duchess of Buccleuch and Monmouth. In passing along, many fine tress were noted, and especially some grand Larches, in a holm near the Yarrow, some of which girth over 10 feet at 5 feet up, with clean straight boles of 60 feet or more. Through the kindness of

His Grace the party were permitted to inspect the magnificent mansion of Bowhill with its art treasures—amongst the most notable being the tapestry illustrative of a Roman triumph, the colours of which, albeit several hundred years old, are as fresh and bright as the day they were sewed. Luncheon was partaken of in one of the halls attached to the offices of the mansion, a stroll was afterwards leisurely taken through the policies. The combination of wood, and lake, and sloping lawn was very attractive, and many a lingering glance was taken of the sylvan glades in the vicinity of the Yarrow. From an arboricultural point of view, however, the deepest interest attached to a visit to Howebottom, or the 'Hained Ground,' with which the afternoon chiefly was occupied. The Rev. James Farquharson, M.A., Selkirk, in the Proceedings of the Berwickshire Naturalists' Club for 1878, thus speaks of the 'Hained Ground':—

THE BEECH AVENUE AT BOWHILL.

'Howebottom is a large irregularly triangular area of about 300 acres in extent, occupying the southern portion of the height on which Bowhill stands, where it runs out into Fauldshope Hill. It ranges in height from 600 to 1,000 feet above sea-level, the upper and narrower portion being steep, the lower falling with a more gentle slope towards the east into the valley of the Ettrick. On the south side it embraces the pretty dell of Shielshaugh Burn; and the surface rises in a low swell from the margin of the dell to fall on the north side into the hollow from which the whole area has taken the name of Howebottom. A stone wall running parallel to Shielshaugh Burn divides Howebottom from Fauldshope Hill, on which sheep pasture; on the other side it is unenclosed, and bordered by the woods of Bowhill, which consist of Scotch Fir, Spruce, and Larch, with a mixture of Oak, Beech, and Ash. At one of the lower corners it touches on an old Birch wood. The general exposure is S.E., and considerable variety of soil and shelter is found within the limits I have described. For the most part the soil is the thin sharp loam characteristic of our Silurian district; but in the highest parts the rock is almost at the surface, and in the lower and more level portions a pretty deep clay soil presents itself. While these lower portions, and the margins bordered by the old wood are well sheltered, the extreme height, where the ground runs out to the apex of the irregular triangle, is much exposed, and open to the fierce blasts of the S.W. wind. Since 1829, the whole of this ground has been 'hained,' *i.e.*, preserved from the intrusion of sheep and cattle: nor has any part of it been under the plough, with the exception of a few small patches near the lower boundary, where oats are sown as food for game. In a letter with which the Duke of Buccleuch has favoured me on the subject of this paper, His Grace says, 'I took sheep and cattle off that ground several years ago for various reasons. One was to improve the picturesque effect by getting rid of the harsh outline of the fence of the Bowhill woods to the west; also to allow the growth of whatever might prove to be the indigenous trees and plants of the Forest, which had been kept down by the continued grazing of stock for many years. I hoped to have seen young Oaks spring up, but in that have been disappointed. * * The Oak of Ettrick Forest exists now only in tradition, though a few specimens still remain.' In another note the Duke adds, 'One part of my intention was frustrated, viz., that of seeing what natural plants, as well trees, would grow and flourish there when 'hained' from cattle, inasmuch as some portions of the ground were very wet and swampy, and were in consequence drained, thus preventing the growth of plants that flourish in wet and boggy places.' What Howebottom was before the Duke resolved to make it the subject of a most interesting experiment, may be seen by a glance at Fauldshope Hill,—a bare and treeless pasturage, bearing heather, and the common hill grasses, carices, and rushes. What it is I shall endeavour to describe. If the experiment of the noble proprietor has failed to secure the reappearance of the native Oak it has fully accomplished his other intention, that of adding to the picturesqueness of the Bowhill grounds. It is easier to give details, and to enumerate the species of trees and plants growing in it, than to convey an idea of the beauty of this wild spot. What strikes one looking on it from the opposite side of the valley is its boskiness,—a certain richness and fulness in the outlines of the trees and bushes, which have had room to grow, and which, standing singly, or gathered into small groups, present most pleasing objects to the eye. A landscape gardener would discover endless subjects of study here, and carry away innumerable hints; while the mere lover of the picturesque will find his eye turning again and again from the larger features of the scenery around, and resting with delight on this charming piece of bush-country. Viewed from Selkirk, in the early part of the present autumn, Howebottom has been specially attractive, with its groundwork of bright green bracken, its large beds of purple heather, and its rounded masses of trees and brushwood, all lying in the embrace of the dense woods, and backed by the flowing outlines of the hills. With the exception of a few trees which have been planted for ornament, and which will be more particularly noticed afterwards, all the wood on the ground must be accounted native, the berries from which it has sprung having been carried by birds, or the seeds transported by the agency of the wind, during the fifty years the ground has been 'hained.' The Mountain Ash (*Pyrus aucuparia*), the Birch (*Betula alba*), and the Hawthorn (*Cratægus oxyacantha*), are the most abundant trees, occurring in nearly equal proportions, although unequally distributed over the ground. Thus, Birch trees are most numerous, as might be expected, in the neighbourhood of the old Birchwood at the S.E. corner of the ground. The Hawthorn appears most abundantly in the middle ground, and under the shelter of the high surrounding woods; while the Mountain Ash prevails in the upper regions, and indeed it alone grows in the highest and most exposed corner, becoming there a stunted tree or shrub, but still holding its ground, although evidently sore battered by the winter winds. There are a good many Scotch Firs (*Pinus sylvestris*) along the line of the Bowhill wood, and a few occur at a distance from the wood. Some specimens of the Ash (*Fraxinus excelsior*) are scattered up and down the whole area, but not one Oak, Beech, or Elm, nor a single Holly. Next to those already mentioned, the most conspicuous objects are three species of Sallow,—*Salix aurita*, *S. caprea*, and *S. cineria*,—which are abundant and flourish vigorously, *S. caprea* often rising to the dignity of a well-stemmed tree. When I have named these eight species, I have exhausted the list of native trees, and tree-like shrubs growing in Howebottom, for I scarcely think a place in the list should be given to the solitary Plane (*Acer pseudo-platanus*) on which I lighted. As regards smaller shrubs, the Raspberry is pretty abundant; but I saw only one Rose-bush (*Rosa canina*), and no trace of the Bramble. A few plants of Juniper (*Juniperus communis*), which is rare in the district, grow among the heather on the height. About 27 years ago, some Deodars, Spruce Firs, and Common Yews were planted in Howebottom. They have grown well, and present an agreeable diversity among the rounded and bushy forms of the native shrubby trees. About the foreign character of the Deodars, of course, there can be no mistake; but in one sense it is unfortunate that, in a space abandoned to nature, and where one looks only for indigenous trees, the Spruce and the Yew should have been introduced. But for the information I received, I should, although with some surprise, have regarded these as self-sown. The same remark applies to a large thicket of Dogwood (*Cornus sanguinea*), which quite fills the upper part of the dell of Shielshaugh Burn. This, too, was planted, upwards of 40 years ago, some idea having been entertained, I am told, by a former factor on the estate, of utilising the wood in the manufacture of gunpowder. The lower course of this burn, I may add, presents the flora of any similar dell in the district. The barren fronds of *Blechnum boreale* hang pendent from the banks; Hazel and Alder (not, as far as I could see, found elsewhere in Howebottom), and Birch fill up the wider spaces: and the Male Shield-Fern and Lady-Fern, with their congeners, adorn the course of the little stream. The lesson I draw from the Howebottom experiment is that in the old Forest of Ettrick there was not a stately and uniform growth of large timber. I infer that the ground along the valleys was clothed with a dense brushwood of Hawthorn, Birch, and Sallow, Mountain Ash mingling with these, but flourishing more freely on the hill-sides: while above this lower growth rose at intervals 'many a semelie tree,'—the Fir, the Ash, the Oak; for although Howebottom offers no evidence that the Oak is indigenous to the district, remains of it preserved in our peat-bogs attest that it once flourished as a native in the vales of Ettrick and Yarrow."

Every member of the party corroborated with his whole heart the enthusiastic verdict of Mr. Farquharson as to the exquisite and unique beauty of the Hained ground. At each successive vantage spot admiraation grew, and the veteran Mr. McCorquodale found fitting expression to the general sentiment when he declared that as an example of landscape forestry, it was the most perfect he had ever seen. The laying-out and planting of the property had been done under the personal supervision of His Grace the Duke of Buccleuch. The walk through the Natural Forest and up to Nethan's Knowe, over a thousand feet above the level of the sea, and admirably furnished to the top with thriving woods, was most thoroughly enjoyed. The only occasion on which the tape was produced was in a clump of indigenous Scots Fir near the Yarrow, when two were measured and found to reach a height of 87 ft. and 90 ft. respectively, and to girth at five ft. from the ground, 7 ft. 11 in. and 10 ft. 8 ins.

A few of the members who did not care to face the steep climb to the top of the hill took to the lower grounds, accompanied by Mr. Martin, and proceeded to inspect the rich woodlands lying on the banks of the Ettrick, between Bowhill and Shielshaugh. Here many large and fine Oaks were observed, which, if not 'lineal descendants' of the ancient Oaks of Ettrick Forest, are at least worthy modern representatives ; along with numerous gigantic and far-spreading Beeches, tall and shapely Larches and Firs, and abundance of the more ornamental trees and shrubs, which altogether give a charm and interest to the woodland walks and drives that is peculiarly fascinating. Through openings in the trees many lovely views of the sylvan slopes and rippling sweeps and reaches of the silvery Ettrick are to be seen, and at such spots comfortable seats are placed where the leisurely wanderer may sit and muse on the charming scenes so delightfully spread out to view. In the spring and early summer these woods must be exceedingly beautiful, with the abundance of wild flowers and flowering trees and shrubs which are seen so plentifully scattered about. One of the most notable features, from an arborist's point of view, in this part of the grounds is, an avenue of line of grand old Planes (*Anglice*, Sycamores), growing at the foot of a high and steep 'brae,' beautifully clothed with hanging woods. These Planes, from their hoary appearance, seem to be the growth of at least a couple of centuries, and are of great dimensions in stem and limb, calling forth the remark of a wood merchant, 'They are worth a fortune!' At the end of the avenue, close to Shielshaugh, lay the prostrate stem of a magnificent Scotch Elm (*Ulmus montana*), which had been overwhelmed by one of the severe gales of the past few years, and which worked sad havoc among the plantations in this district. There was no means of passing the measuring tape round the recumbent giant ; but, as it lay, it was estimated to be about 15 ft. in girth, and one of the largest trees seen during the day. Its loss by the fury of the storm is much to be deplored, especially here, where such 'monarchs' are rare, and where every precaution is taken against the decay and ruin of such noble objects.

The other and more numerous section of the party, under the guidance of the intelligent garden-foreman, Mr. George Brown, bent their steps towards the top of the hill, halting every now and again at the spots from which the most charming views of Ettrick and Yarrow could be obtained.

Descending from the hill, and joining the party exploring the lower grounds, an inspection was made of the curious 'Knarled Beech Avenue,' said to be over 300 years old, the stout stems and massive limbs, with the long twisted branches and gnarled roots, having a very picturesque effect in the deepening shades of the afternoon. A visit was then paid to the neat and well-kept gardens, which have been for half-a-century under the skilful management of His Grace's veteran gardener, Mr. Mathison who is probably the oldest gardener (having nearly reached *four score and ten* years) now on active service in Scotland, and still possessed of the unflagging energy and interest in current affairs of men half-a-century his juniors. Everything about the garden and grounds at Bowhill indicated good taste and good management on all hands.

Bidding adieu to our civil and obliging guides, the vehicles were again brought into requisition, and the drive to Selkirk made without delay. The evening train to Edinburgh brought the party safely to the Scottish metropolis, all delighted with their visit to and inspection of the beauties of Ettrick Forest.

* * *

THE OAKS OF KYRE.

THERE are few mansions in the midland counties that have a more interesting historical record than Kyre Park, the seat in Worcestershire of the Rev. Edward G. Baldwyn Childe. The house has lately undergone extensive alterations, carried out in keeping with the ancient character of the place, which dates back to the time of Edward I., who granted letters patent at Gloucester in 1275, 'To our trusty and well beloved John Kyare, leave to enclose his woods at Kyare Wyard, and then to make Parks, and the Woods so enclosed and the Parks then made to hold to him and his heirs for ever.'

The area enclosed under the above-named grant was about 500 acres, and included the grounds round the mansion, also the Deer Park, which contains about 150 acres, encircled by a high fence, and containing some fine specimens of the antlered monarchs of the forest. On a gentle eminence, a short distance from the Tenbury and Bromyard main road, stands the famous 'Gibbet Oak,' supposed to have been used as the place of execution for spies and traitors in the Wars of the Roses. This tree measures in circumference 24 ft. five feet from the ground, and its huge and widely-extended arms, standing out at right angles some 8 ft. or 9 ft. from the ground, seem to be well adapted for the use then made of it. A short distance from this tree is a remarkably fine row of stately Beech trees, some of which are 12 ft. to 14 ft. in circumference.

Leaving the Deer Park, we cross the turnpike road to 'Wheat patch Grove.' The first object of interest we come to is a remarkably fine Yew tree, 26 ft. in circumference, standing a few yards from the boundary of the Counties of Worcester and Hereford. This tree was used as a court of justice in former times. The proprietor—for the time being—of Kyre Park was qualified to act as Magistrate for both counties, and when a Herefordshire case came before him, he was wont to adjourn to the old Yew tree. Courts Leet and Courts Baron were also held under this tree. A little to the left of this interesting spot there is a fine grove of Scotch Fir trees, the plants of which are said to have been sent over by King James, and by him called Scotch Firs. Directly opposite to this grove are the far-famed Oaks referred to by Habingdon, the antiquary, who, writing during the reign of Queen Elizabeth, says: 'The park of Kyare Wyard is worthy to be mentioned, being adorned with so many tall and mighty Oaks, as scarce any ground in England can show so many.' Twenty Oak trees have fallen this spring in this grove and the adjoining field, and have been sold for £1,000, and these are by no means the finest trees. On an area of six acres there are now standing about one hundred 'tall and mighty Oaks' ranging from 80 to 126 ft. high, and measuring from 10 to 26 ft. in circumference, five feet from the ground, and estimated to contain 22,000 ft. of timber.

In the Hannings Grove adjoining, but in the county of Worcester, there stands within an area of one hundred square yards three Oak trees with 1,050 ft. cubical contents.

In the year 1874 a grove of twelve acres on the east side of the road, which intersects this estate for a distance of six miles, was thinned, and the produce realized at an auction sale £6,080.

One of the farm-houses on this estate, called 'Netherwood,' is said to have been the birthplace of Queen Elizabeth's favourite, the Earl of Essex. The mansion is surrounded by remarkably picturesque grounds, the lakes are covered with most beautiful water lilies, and the walks are shaded by every description of rare and charming trees and shrubs. On the banks of one of the lakes is a curious hermitage with several quaint specimens of ancient poetry in English and Latin.

'THE OLIVE ALBUM.'—Messrs. Marion & Co. have sent us a copy of 'The Olive Album,' which, like all the work that is issued by this eminent and enterprising firm, is in the highest degree artistic and beautiful. The cover—in whole calf, with its thin border of gold and the solitary figure of a lily raised in relief, enamelled in green and white and set off with gold—affords an illustration of elegant simplicity not often found in articles of this kind. The designs within are executed upon an olive-green ground in gold and colours, and the flowers, which are conspicuous in the ornamentation, are executed with wonderful fidelity to nature, the lilies, tulips, and mistletoe deserving special praise. Altogether, with its elegant clasp, this is a very charming album, and must surely attract unusual attention during the coming presentation season, for we can scarcely conceive that one could select, of its kind, a more elegant gift.

APPOINTMENT.—Mr. John Leishman, who has been foreman to Mr. J. Michie, Balmoral, for the last three years, has lately been appointed Forester to Captain Palmer Douglass, on the estate of Cavers, near Hawick, N.B.

ENGLAND.

THE usual characteristic of November is a season of gloomy, hazy weather, often accompanied by rains, sleet, and wild stormy winds; yet the amount of rainfall is not as great as in some other months. The average dew point is reduced about 16° below the average of July, and the evaporation amounts to little more than one inch. The average rainfall is about 2¼ inches; and an inch of rain means a gallon of water spread over a surface of nearly two square feet, or 3,630 cubic feet, equal to about 100 tons upon an acre.

Very few plants come naturally into flower in November, yet a considerable number of fruiting ornamental shrubs adorn it with their fruits, and several hardy shrubs and herbaceous plants adorn it with their flowers, sometimes until near the end of the month.

Orchard.—Trench and prepare ground for planting. The sooner the trees are transplanted after the leaves have fallen, the greater the certainty of success. If the ground is dry, water copiously; and a mulching of long dung will be of great advantage. About ten days after the leaves have fallen, the pruning of orchard fruit trees may be begun, and large limbs may then be removed with greater impunity than at any other season.

Fences demand much of our attention during this month. Continue to act upon the instructions given last month. Cut, plash, and lay old hedges; and plant new hedges where the ground has been properly prepared. Hedges planted at this season will be found generally to answer better—particularly upon a dry site—than if planted in the spring. Dig and clean both sides of all young hedges.

Fill in gaps with well-rooted strong plants; and encourage their growth by applications of rotted manure or well-mixed compost.

Plantations. — Push forward planting upon all dry or well-drained grounds, leaving as little as possible of this work until the spring. Where the lands are spongy or wet, there may be an advantage in delaying the planting of such until the early months of the approaching year; but where the lands are dry, planting should be pushed forward whenever the weather is favourable.

Thinning and pruning may also be carried on in young plantations, where this does not interfere with shooting arrangements. I consider the early and judicious pruning of young hardwood trees to be of the greatest importance in the cultivation of healthy and sound timber, and I have no faith in the old notion of allowing such trees to prune themselves. During a practice extending over thirty-five years, I have had many opportunities of witnessing the baneful effects of this nature-pruning mode in various parts of the country, and noticing the vexations and losses occasioned by the many defects in the timber produced upon this slovenly and careless system. I do not advocate the amputation of large limbs from trees that are being grown for useful purposes, but recommend early and regular periodical pruning, with careful thinning, until the trees arrive at that stage in their development when they can be left to expand into useful timber. If this work is performed with that care and judgment which the importance of the issue demands, there would be fewer defects to complain of in the timber when the matured tree is stretched upon the saw-bench for dissection.

Woods.—Fell timber and arrange for sales as early as possible, to afford time and opportunity for removal, which frost will greatly facilitate.

Collect fallen leaves and cart to the depôts; and in frosty weather remove the rotted leaves of former gatherings from the depôts to the nursery ground, or where otherwise required.

Finish the collecting of tree seeds, and dispose of them according to their kind, laying in heaps to rot, or spreading in the drying loft, as the case may require.

Nursery.—Ridge up all plots of ground in the nursery as soon as they become vacant, and push on the operations recommended for last month as the weather will permit. Remove layers from stools and plant them into the nursery lines. Dig around and dress the stools, giving them a dressing of well-rotted manure and matured compost. Lay down the young shoots produced last summer.

Field Drains and outlets not examined and attended to last month should receive immediate attention before frosts set in and before the lands become saturated by the rains we may expect at this season of the year.

A. Paterson.

Hunstrete, Pensford, Bristol.

SCOTLAND.

General planting operations should now be pushed forward where soil and situation are favourable for being operated on at this season. On all soils with a grassy surface the turf should be pared off before the plant is inserted. In all extensive enclosures spaces for main roads should be marked off and left unplanted, and when the weather is unfavourable for planting the hands employed might with advantage be occupied in forming these roadways.

Continue the cutting of Pine and Fir timber and the thinning of plantations. Young plantations should be well thinned on the outsides, especially on the windward side, so that the trees left may have space to branch low and root well, and thus be in a better condition to resist destructive winds, and to exclude them in a great measure from the interior of the plantations. Those plantations which have not been thus treated in a young state must ever afterwards be very sparingly thinned in their margins.

Continue the trimming of hedges, and complete the same as soon as possible. Plant young hedges of Hawthorn and Beech in well-prepared beds, and make good all gaps in existing hedges. Upon light dry soils a good proportion of Beech should be used. Clear up and burn the prunings as the work of trimming proceeds.

Dig, trench, or ridge up all vacant plots in the nursery ; transplant, if convenient, the larger stuff not to be turned out. Seedlings, in my opinion, should not be laid in the spring. Leaves may now be collected and carted to convenient places to rot.

Ditches and the mouths of closed drains should receive attention where the falling leaves are likely to obstruct the flow of the water.

Draining or other necessary preparations for spring planting should be continued where yet uncompleted.

Metal roads, gravel drives and walks as the work can be over taken, and proceed with groundwork improvements.

Darnaway, N.B. D. Scott.

IRELAND.

Felling heavy timber should now be commenced. All kinds, except Oak, which may be kept for the sake of the bark, can now be cut and removed. Trees to be removed from pleasure grounds, and in the fields requiring to be uprooted, should be taken in hand during the current month. The same remark applies to the general felling of trees in the plantations.

Alterations about the policies, such as extension of garden or pleasure grounds, or the making of new avenues, should be begun at once, especially if assistance is required from farm-horse or hand. When such operations are delayed until later on, spring work on the farm usually interferes, and, of course, the work is retarded.

Deep underground drainage will also form no inconsiderable item of work for this month. Wherever such has to be done, now is the time to proceed with it. Levelling of ditches, and making new ones where fields are enlarged or subdivided, is another important item for the month. Lift and replant old thorn quick. When moving from place to place, keep the root protected. Old quicks can be transplanted successfully if one or two little points be attended to. Before taking them up, cut or head them down: the shorter the better. Do not slash the root more than necessary for lifting. If to be taken to a distance, keep the roots protected. In the new site, which ought to have been previously prepared by trenching and digging, the quicks should be planted with as little delay as possible.

See that the best soil is put next the roots, and protect for a season, when the following year it will be a good fence.

Continue planting forest trees where the ground is dry and suitable. Do not for the present plant in moist or wet land: this will be best done later on. Great care should be taken of the young plants between the time they leave the nursery and being planted, so that they are never exposed to either the frosts at night or the cold winds during the day. Much of our disappointment in planting is attributable to inattention to the plants during transit.

All sorts of work will now be required in the home nursery: trenching, sub-soiling, digging, and cleaning; planting seedlings from the seed beds; layering from stocks, and planting cuttings.

Collect all the leaves as they fall, and cast them with road-scrapings, into the compost heap. In fact every kind of mould should be collected, as there is nothing to equal a compost dressing for raising forest trees or shrubs.

I have to report very little damage done during the late gale to forest trees in Ireland. We are fortunate so far.

Tipperary. D. SYM SCOTT.

WALES.

THE present month being one of the best of the year for planting forest trees of all sorts, will be a busy one with foresters in general.

It will, therefore, be advisable to push forward planting with all available strength during open and fine weather. Plant all ground that is thoroughly dry and warm, at once, leaving such as are undergoing draining or have been recently done till later on. Continue the drainage of ground for planting in the spring, as well as fencing and other preliminary operations. As recommended last month, continue the planting of hedges of all varieties.

The cutting of underwood and the thinning of plantations of all sorts, should now be proceeded with. Where firewood and faggots are in demand, or required for home consumption, the underwood and branches of suitable thinnings should be bound up and removed as convenient. As timber and thinnings are removed from plantations, all open drains and ditches may be cleared out and fences repaired where necessary.

Cut down hedge-row timber, and remove the same during dry and favourable weather.

Finish up as early as possible the forming of drives and walks ; also prepare stones and gravel for the necessary repairs of roads and carriage drives. Cart leaves to the compost heap, and fill up vacant ground in the nursery.

Kinmel Park. LEWIS BAYNE.

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BURNHAM BEECHES.—The public dedication of the delightful bit of forest called Burnham Beeches took place on the 3rd of last month, and was so fully reported in the daily papers that detailed mention of the event here is unnecessary. The occasion, however, deserves especial notice from the circumstance that the downpour of rain the whole day was persistent and depressing to an extent not often experienced on such festive occasions. But solace was found for the excessive dampness *without* in the 'good cheer' provided by the Corporation of London for the hundred guests who assembled after their carriage visit to the Beeches at the great hall of Eton College. The wines at that most successful and pleasant gathering were of especial excellence. They were supplied by Messrs. Chapman & Co., of 10, Savage Gardens, Tower Hill, who have courteously sent us some of them to 'review.' We have done so, and have found the proceeding most agreeable—so agreeable that we can cordially recommend the work of making acquaintance with Messrs. Chapman & Co.'s wines to our readers.

AN AUTUMN PLAINT.

HOW dreary are these skies, heart!
The woods how wild and wan!
Swift swallows for the South start—
Stern Winter presses on.
Alas! my heart, the blast's breath
Hath chilled thee, and aghast
Thou broodest o'er the sad death
Of joys too bright to last!
No more for thee the fond dreams
That came at twilight time;
No more Hope's false, yet fair, gleams
That made the morn sublime:
No more the flush of joy, heart,
That shed its rosy glow
Through all thy quiet depths, heart,
When vernal blooms did blow.
The gloom that shrouds all mute things
Hath surely spread to thee:
Close curtained by the dark wings
Of woe—Ah, me! Ah, me!

* * * * *

In Memory's tablets are many leaves,
And some of them fair and green
As those from whose tresses bright June weaves
A shield from the Sun-God's sheen:
Some may be blotted with bitter tears,
That tarnish the tale they told
Of the bygone scenes of those fairy years
When earth was of virgin gold.
But the page so fair to the youthful eyes
Shrinks under Time's tonic test,
And blackens slowly, like sullen skies,
When the Storm-King brews unrest.
There is a leaf that I would were bright
As it was when the roses blushed:
There is a heart that I would were light;
But the voice of Hope is hushed!
From Memory's tablet I tear that leaf—
There shall it have no part;
I snatch it out of that secret sheaf,
Out of my aching heart!

F. B. DOVETON.

AN ENQUIRY.

SIR,—My son now rents a moor in a lovely part of this county, called Blanchland, which is on the borders of Northumberland and Durham. The former tenant having a dislike to adders, &c., supplied himself with goats to destroy them (which these animals are very clever in doing). The lovely woods being found to suffer from such unsuitable inmates, he (I conclude in ignorance) painted the suffering kinds of trees with coal-tar as a preventive! The Planes, Rowans, Willows and Beeches, are all victims, and up to the height of eight or ten feet are encased in this black band, and evidently dying. I notice where Nature has made a strong enough effort to split *down* the bark the trees look more hopeful; but in dozens of cases the entire bark is falling on to the ground, leaving the wood bare, and, of course, dying. Will anything save these *treasures*, as trees must ever be considered? I have thought that perhaps oil, well rubbed into the injured bark, might do good, since it seems so burnt. Can any of the readers of 'FORESTRY' suggest a remedy?

Thornhill, Sunderland.

THERESA T. LAING.

[We fear that irremediable damage has been done to the trees referred to, except in the instances mentioned, where Nature is rising superior to the injury which has been done to her. But if any of our readers could suggest a remedy, we shall be glad to publish it.—ED.]

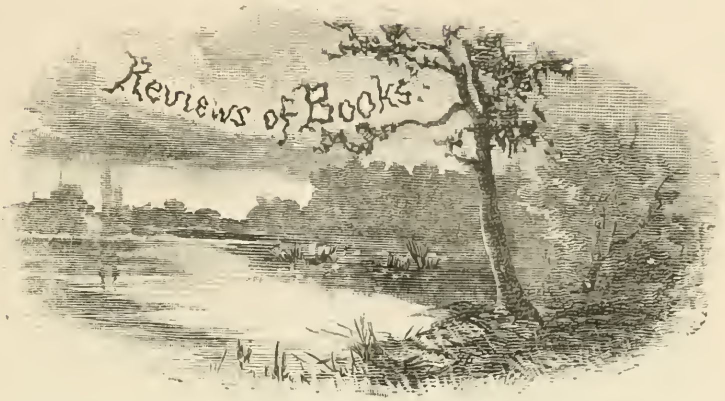
THE EXHAUSTION OF SOILS.

Sir,—In your October issue, p. 452, 'N. N.,' in his criticism on Mr. Paterson's views on pruning, says,—'If, on the other hand, the covert of unmixed Oak be very open, the soil is liable to be exhausted by heavy annual crops of grass, brackens, and other weeds.' Now if grasses, &c., which may grow and decay on the same soil year after year for many years, exhaust the soil, how great must be the exhaustion where, along with the production of this grass, the soil produces, say, 100 tons of saleable timber per acre. As 'N. N.' is not singular in the opinion he thus expresses, perhaps he or some of those who hold the same views, will be so kind as to tell us how they became aware of this exhaustion.

D. M'Corquodale.

Dunrobin, Golspie, N.B.

Catalogues.—We have received from Messrs. Rivers & Son their illustrated 'Catalogue of Fruit Trees,' as well as their 'Catalogue of Roses:' an Illustrated Catalogue from M. Paillet, Nurseryman, Vallée de Châtenay, near Paris; and Price Current of Fruit Trees, Forest and Ornamental Trees from the 'Etablissement d'Orticole de Bruant.'



The Forest Flora of South Australia. By J. E. Brown, F.L.S., Conservator of Forests for the Government of South Australia. Adelaide: E. Spiller, Government Printer. Part II.

The second instalment of this magnificent work has reached us. When it is remembered that the length of the serial is nearly two feet, and its breadth nearly a foot and a half, it will easily be imagined that it will make a truly noble appearance when the book is completed and bound. The present number contains five beautifully-coloured plates, full-paged. These are representations of leaves, blossoms, fruit, and wood of the following species and varieties: *Eucalyptus leucoxylon*, or the Blue Gum; *E. leucoxylon*, var. *Macrocarpa* (the Red-flowering variety); *E. leucoxylon*, var. *Macrocarpa* (the White-flowering variety); *E. leucoxylon*, var. *Pauperita* (the Scrubby Blue Gum); and *E. cosmophylta* (or the Large-flowering Scrub Gum). The author divides the letterpress which accompanies the plates into four sections under the several headings of 'Specific Name,' 'Vernacular Name,' 'Local Distribution,' and 'Popular Description.' The 'Popular Description' section is sub-divided into paragraphs dealing with the 'young leaves,' the 'sapling leaves,' the 'old leaves,' the 'inflorescence,' the 'young bark,' the 'old bark,' the 'flowering period,' and the 'general appearance and predilections. We shall look forward with increasing interest to the succeeding numbers of this really beautiful serial, which will, we trust, secure a large circulation in this country.

Scottish Pictures drawn with Pen and Pencil. By Samuel G. Green, D.D., Author of 'French Pictures,' &c. Illustrated by Eminent Artists. London: The Religious Tract Society.

It is positively delightful to turn over the leaves of this beautiful

ON THE FINDHORN. *From 'Scottish Pictures.'*

volume, one of a very charming series which is issuing from the productive press of the Religious Tract Society. We have lately had occasion to notice with high commendation two similar volumes from the same publishing house—Dr. Macaulay's 'Sea Pictures;' and the 'Crown of Flowers,' edited by Mr. Charles Peters.

The author of 'Scottish Pictures' tells us that his pages contain memorials of several tours in Scotland undertaken at different periods of the year. Beautiful as the illustrations are, the text is not subordinated to them, but most pleasantly fills in with detailed information the spaces which lie between embellishment and embellishment. No object of interest has been neglected by the artists, the illustrations are of all sizes, and have been so adapted and arranged as to suit the smaller or greater requirements of the subjects represented. Dr. Green makes these fall under seven headings. He gives us descriptions and pictures 'across the Border, to Edinburgh and Glasgow,' and then he furnishes us with glimpses of Edinburgh and Glasgow. He takes us by the Clyde to the Western Coast, through the Western Highlands; to the central islands from Stirling to Inverness, to the Eastern Coast and Deeside, and finally, 'To the Far North.' It is rather difficult to indicate especial excellence in the wood illustrations when all is so good; but after the eye has lingered awhile on the frontispiece, 'Flowerdale, Gairloch, Ross-shire,' and upon the pretty river scene, 'Aft on Water,' on the title page, one notes with especial pleasure amongst the illustrations scattered so abundantly through the text, the following:—'The Braes of Yarrow,' 'Hawthornden,' 'Habbie's Howe,' 'Stonebyres Falls,' 'On the Doon,' 'The Auld Brig of Doon,' 'The Shore of Iona,' 'Ben Nevis,' 'Cape Wrath,' 'Through the Trossachs,' 'Ben Venue,' 'In Glen Dochart,' 'Lower Fall of Foyers,' 'Land of the Mountain and the Flood,' 'Relics of Birnam Wood,' 'Stirling Castle,' 'Larches of Dunkeld,' 'Hermitage Bridge,' 'Birks of Aberfeldy,' 'Glen Tilt,' 'Bruar Water,' 'Loch Ruicht and Caergorm,' 'The Grampians,' 'On the Findhorn,' 'The Ladies' Walk, Grantown,' 'Banks of the Doon,' and 'Lochnagar.' By the courtesy of the publishers we reproduce some specimens of the engravings which adorn a very charming volume.

Farm Roads, Fences, and Gates. By JOHN SCOTT. London: Crosby Lockwood & Co.

THIS is the third volume of the excellent series of 'Farm Engineering Text-books,' and is a practical treatise on the roads, tramways, and waterways of the farm, the principles of enclosures, and the different kinds of fences, gates, and stiles. It is full of engravings illustrating the text, and is, like its predecessors, a marvel of cheapness and an excellent and invaluable hand-book.

HABBIE'S HOWE. *From ‘Scottish Pictures.*

THE LATE MR. JAMES LITTLE.

DEATH has removed from our midst, at the ripe age of eighty years, our old friend and frequent contributor on forestry subjects, Mr. James Little, one of those energetic and enterprising men that have done so much for the development of the country of which the North of Ireland has sent us many good examples. He arrived in this country alone in 1823, being at the time in his nineteenth year, and went to Niagara, then the principal wholesale market of the West, supplying the village of York, now Toronto, with goods. After remaining there for a couple of years he removed to St. Catharines, where he made the acquaintance and lifelong friendship of the Hon. Wm. Hamilton Merritt, through whose perseverance and energy the Welland Canal was built, and whom he accompanied on the first vessel passing through the canal. At St. Catharines he married, and moved with his wife to a place on the Grand River, now called Caledonia. At this time, about 1833, the whole country was a wilderness inhabited by the Six-Nation Indians, and Mrs. Little passed months at a time without seeing the face of a white woman. This section of country is now wholly settled, and is called the garden of Canada. Here he engaged in lumbering operations, which increased with the growth and prosperity of the country till his business extended over nearly the whole peninsula lying between Lakes Erie and Ontario, at one time having twelve different lumbering concerns in operation. Here he carried on an active business for a period of nearly thirty years, and the extent of his operations is mentioned to point out peculiar characteristics of his unbounded faith in human nature. It is, however, more with his life in our midst that we have occasion to speak of him. Coming here at the advanced age of seventy years, a period of life when one less energetic could have rested from his labours, his active mind would not remain quiet, and the columns of the *Witness* often sent forth words of warning from his pen on the important subject of forest protection. Thus he became from one of the most active in the destruction of the forest one of the most ardent advocates of forest protection, and his great personal knowledge of the lumber business and the rapidly decreasing area of forest territory enabled him the more readily to draw the attention of the public to the facts, and though jeered at and ridiculed by empyrics, his persistence in the discussion forced a recognition, till he was able, before his death, to see a full acknowledgment of the soundness of his views by receiving a special vote of thanks from the American Forestry Congress, and by having his name placed as honorary president of the Forestry Association of this Province.

Mr. Little was born near Londonderry, and though all his family were business-people, his brother's, as he was himself, were fond of literature, his younger brother David being one of the best linguists of his day. His proficiency in languages was the cause, on his visiting New York, of his being made president of the Society of Letters, a society having among its members such names as Washington Irving and Wm. Cullen Bryant. Mr. Little leaves a widow, four sons, and two daughters to mourn his loss, and who have the sympathy of the public in their heavy affliction.—*Montreal Daily Witness.*

Killed by a Falling Tree.—A sad fatality recently occurred in a wood on the Dunira estate near Comrie, Perthshire. Whilst a young man named John McGregor was cutting wood a partly-uprooted tree fell upon him, crushing him in a fearful manner, his body being doubled up and his back broken.

Clog-making. — In almost every district round about Shropshire, Herefordshire, and North Wales, as one travels through the woods, the traces of the clog-makers are to be seen; this branch of the trade is in rather a good condition when compared with other branches, and Alder, which is the best clog timber, finds a ready market. Of course it saves very considerably by manufacturing in the wood where the tree falls, the railway carriage and haulage of clogs being so much less than when conveyed in the tree. The price of Alder, like other timber, varies, of course, according to quality, from 8d. to 11d. per foot.—*Timber Trades Journal.*

Forestry in the United States.—The American Association for the Advancement of Science has addressed a memorial to the various State Governors, on the importance of preserving and increasing the forestry supplies. The memorial recommends the protection by law of all trees planted along the highways, and the reduction of taxes for encouraging such planting; also the exemption for a time from taxes of bare land, which shall be planted with trees, and the appropriation of money as premiums for successful tree planting. It also suggests that prizes should be offered for the best reports and essays on practical forest raising, to be published and disseminated; the encouragement of educational institutions in introducing a course of instruction on tree raising; and the imposition of penalties for careless or wilful setting forests on fire. With regard to the timber supply of the United States, it appears from estimates of the amount of White Pine standing in locations available for the markets, that the price of Pine lands in many sections has been greatly advanced. It is stated that no forest of Pine wood on American territory now remains unexplored, and the entire supply does not exceed 80,000,000,000 feet. The annual production of White Pine lumber is not far from 10,000,000,000, and the demand is growing beyond the capacities of the forests. In a few years it is expected that there must be a positive cessation in the supply of the most generally used lumber. It is hoped, however, that the advance in price will do a little towards curtailing the destruction of the forests. It is estimated that about 5,000,000 feet of lumber are used annually in the manufacture of oars alone, principally White Ash. The chief manufactories are in Michigan and Ohio, and American-made oars are said to be the smallest, handsomest, most uniform, and altogether the best and cheapest in the world.—*Times.*

DURING the past month the International Forestry Exhibition at Edinburgh has been making steady progress in public favour, and is receiving the most influential support that the warmest advocate could ask for it. The extensive list of patrons last issued, and graciously headed by Her Majesty The Queen, includes the Prince of Wales, and the Royal Dukes of Edinburgh, Connaught, Albany, and Cambridge; the Prime Minister; the Foreign, Colonial, and Indian Secretaries of State; the Lords of the Admiralty, and the Council of Education; the Ambassadors for Denmark, Turkey, Italy, Chili, and Siam; the Rajah Brooke, of Sarawak; nearly three hundred Peers, Baronets, Members of Parliament, and other landowners and distinguished persons. With such an array of patrons, the success of any enterprise for the public good would be ensured, and it now remains with the Committee and the Edinburgh authorities to make it a thorough success, in every sense.

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ON Wednesday, the 21st ult., a deputation from the Executive Committee of the Exhibition, headed by Dr. Cleghorn, of Stravithie, in the unavoidable absence of the Marquis of Lothian, waited upon the Lord Provost's Committee of the Town Council of Edinburgh, and expressed their earnest desire to have a portion of the West Princes Street Gardens set apart for the Exhibition, including the Castle slopes, as being suitable for showing the forest trees which grow at various altitudes. It was explained that the gardens would not be materially injured in any way. The buildings to be erected would only occupy the space upon which no valuable trees are growing, west of the band-stand now in the gardens; and it was also explained that the turf would be saved as far as possible by the buildings being raised above its level. The remainder of the gardens would be left open to the public. After the deputation retired, a general desire was expressed by the Committee to meet the wishes of the deputation if there was likely to be no material or permanent injury done to the gardens. A Committee was in the meantime appointed to inquire more particularly intothe details, and bring up a report at another meeting of the Lord Provost's Committee.

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This is exactly the spirit in which the application for such an admirable site should be responded to, and it shows how anxious the intelligent citizens of Edinburgh are to promote public interests, and that which is calculated to advance the education and improve the taste of the age. These beautiful gardens are admirably suited for a Forestry Exhibition; and instead of any material injury to them arising from the Exhibition, we are confident that after it is held, and the erections are cleared away, the gardens will be very materially and permanently improved. Whatever requires removing, in the way of lawns, shrubberies, or flower borders, can be easily done, in accordance with the best style and taste of the day, so that any temporary exhibition occupying the ground only for a short season, and so intimately connected as Forestry is with the higher Arts and Sciences, is certain to prove a great attraction during its season in the Northern capital, and to leave behind pleasant memories, with an increased taste for sylvan beauty, and all that is lovely and interesting in Nature.

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Since our last issue we have received the Sixty-first Report, being the thirty-second under the Act of the 14 & 15 Vict. cap. 42, of the Commissioners of Her Majesty's Woods, Forests, and Land Revenues. Attached to the Report is a table, giving at a glance an account of the sums paid in to the Exchequer from the Department since the year 1853, and up to the 31st of March in the present year, the whole of the period thus tabulated referring to the operations of the Commissioners of Woods since the separation (which took place, it will be remembered, in 1851) of that body from the Commissioners of Public Works. From this table it is easy to trace the financial progress of the Department, and the figures show, as the Commissioners remark, 'an almost continual annual increase in the amount paid to the Exchequer out of the produce of the woods, forests, and land revenues.'

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In 1853, the first year given, the amount was £252,000; in 1858 it had grown to £276,654. Five years later it had become £300,000; in 1868 it was £345,000; in 1873, £375,000; whilst in 1878 it was £410,000. The same revenue accrued in the following year. Indeed, the three years 1877–9 produced, each, exactly the same amount, viz., £410,000. Then commenced a decline in revenue, which fell, in 1880–1, to £390,000 for each year, and in 1882 and 1883 each to £380,000. In explanation of this decrease the Commissioners remark that it was 'principally to be attributed to the severe agricultural depression, which rendered it necessary to make considerable allowances to many of the Crown tenants out of the rents payable by them, and also to permit some of the rents to remain unpaid for various periods.'

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THE payments to the Exchequer shown in the preceding statement, were, the Commissioners explain, made out of the receipts arising from the whole of the Crown property in their charge. The property, for purposes of management, is divided into two parts, one of which consisting of the Royal forests, and of the greater part of the plantations in England, and also of the land revenues in Scotland, Ireland, Wales, and in the Isles of Man and Alderney, is in the charge of Sir Henry Loch. The remainder is in the charge of the Honourable Charles Gore. Mr. Gore's portion consists of (1) Windsor Great Park, plantations and property at Ascot, Bagshot, Virginia Water, &c.; and (2) manors, messuages, land, &c., in various parts of England. The property described under the first head consists of more than 14,000 acres of land, maintained as part of the domain attached to Windsor Castle.

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'THE income,' says Mr. Gore, 'arising from, and the expenditure upon, that property which, like the Royal parks in London, is largely used by the public for purposes of recreation, cannot be considered as a matter solely for profit and loss.' The public sentiment will certainly support this contention, for even the best results arrived at in the way of revenue would be insignificant compared with the inestimable value accruing to the public from the use of these lands as recreation grounds. The cost of the maintenance of Windsor Park for the year ended last March was £25,138, and the income only £5,232; but there are few better purposes to which public money can be devoted than to the maintenance and beautifying of open recreation grounds.

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THE property described under the second head mentioned by Mr. Gore 'contains about 70,000 acres of land let for agricultural purposes, about 560 houses let at rack rents, or at rents that have been fined down from rack rents; about 5,000 houses that have been built by Crown lessees upon land let upon building leases; various collieries and other mine works, and numerous small miscellaneous hereditaments.' The revenue derivable from this property in 1875 was £327,278. Last year the amount was £367,553. For details of these items and for particulars of the amounts expended in drainage and improvements of Crown lands for the benefit of Crown lessees, as well as for other matters of interest in connection with the subject, we must refer our readers to the report itself.

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In a recently published letter, Mr. Vernon Heath, the well-known photographer, makes some interesting remarks anent the Burnham Beeches. He says, in answer to the question, 'What age are the Burnham Beeches?' that nearly every article written on the subject in connection with the recent ceremony of dedication, mentioned the tradition of Burnham Beeches having been pollarded by Cromwell's army, a tradition, in my estimation,' he says, 'as equally without foundation as some other devastations that are ascribed to it. In the poet Gray's letter to Horace Walpole, dated September, 1737, he speaks of these trees as "most venerable Beeches that, like most other ancient people, are always dreaming out their stories to the winds;

"And as they bow their hoary tops, relate
In murmuring sounds the dark decrees of Fate,
While visions, as poetic eyes avow,
Cling to each leaf, and swarm on every bough."

Clearly Gray is here using the word "venerable" to describe, not the boles merely, but the limbs and boughs. Now let us take some date of the Cromwellian period, say, that of the battle of Worcester, 1650, and it will be seen that between this and Gray's letter there are only 87 years, a period insufficient for the pollarded trees to have grown "venerable" limbs. Gray's letter, it will be observed, was written 146 years ago. I myself have known Burnham Beeches 46 years, and during this time, in my belief, the boles of the great trees have scarcely in any way changed; at all events there is no perceptible change, for they were just as much mere shells when I first knew them as they are now. At the time, too, of my early acquaintance with them I remarked, within the hollows of some, formations and characteristics that have to this day in no way altered. Beyond this I used to find out all the very old people of the district, and learnt that, within their knowledge of them, these trees appeared in no way changed; that they were hollow when they were young, and more than that, their fathers described and spoke of them as hollow trees when they were children.'

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Mr. Vernon Heath adds :—'Of course it may be said that this is traditional, but as my own 46 years of watching and observation is not, I think, the evidence of the old people I actually saw and talked to may be allowed; and say that one of these was 80 years of age. Then 80 and 46 together would bring us to within 20 years of the date of Gray's letter. From this I evolve the theory that the boles were in his days much as they are now; and this being so, I argue that the pollarding occurred long prior to Gray's or Cromwell's period, and I believe that whenever it was done the trees were full grown. Such being the case, the age that has been accorded them in the various articles that have lately been written, viz., 400 or 500 years, is obviously a great deal too little. It would not surprise me should it be discovered that those veritable giants of land of old were trees at the time of the Norman Conquest. It is at least a curious fact that the well-defined remains of a moat within the district of the Beeches, which by the people in the neighbourhood is called "Harlequin's Moat," is, in the old records, written Hardicanute, and is, no doubt, one of the places of defence the Danish king made when, on the death of his brother, the first Harold, he was on his way to seize the Crown of England. To the students of tree-life, especially to those who have not actual acquaintance with these Beeches, I may say that the whole have been pollarded; that the whole are hollow, reduced indeed, as I have said, to a mere shell, and, therefore, all the usual means of arriving at a tree's age are absent. I may add that, in my records of their size, the girth of one, 5 ft. from the ground, is 23 ft. 9 in., another 21 ft. 4 in., while one which was blown down in 1875, the "Autumn" of my fourth season, girthed 25 ft. 6 in.'

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We commend those who have not yet seen these remarkable trees—which are quite unlike anything else of their kind—to visit them during the present winter, when a better idea can be had of their curious forms than during their period of leafy beauty.

LEAF CANOPY AND PRUNING.

I.

LEAF canopy producing shade in a covert is attained when the crowns or leafy tops of the trees in a state of rest touch one another or interlace. The shade is more or less thorough according to the completeness of the canopy and the denseness of the foliage of the various kinds of wood. Where complete and unbroken leaf canopy is maintained and the kind or kinds of wood afford sufficiently dense foliage to intercept the sun's rays, a process of natural pruning or suppression of lower branches goes on under the shade, which renders artificial pruning in a great measure superfluous. If, on the other hand, the trees are kept so far apart that their canopy is discontinuous or interrupted, there will be more need for artificial pruning with a saw or sharp instrument, in order to give the trees length of bole and a desirable form. The maintenance of complete leaf canopy taxes the dexterity and forethought of the forester to the utmost, as may be gathered from Bagneris' 'Sylviculture,'* in chapter second, on the application of the method of thinnings to the principal forest trees, and elsewhere throughout the work. The advantages accompanying or derived from complete leaf canopy are many and various. Some of them may be enumerated as follows :—

1. The ground is sure to be completely stocked with as many trees as there is room for.

2. The degrees of moisture of the soil are equalised and favourably modified at all seasons. The stored-up moisture is preserved against the action of the sun and wind in summer and in seasons of drought. In winter, on the contrary, and in wet seasons, a complete canopy of branches and twigs or spray among deciduous trees, or of foliage among evergreens and needle woods, intercepts a considerable quantity of atmospheric moisture and keeps it from over-saturating the ground.

3. A greater quantity of leaves and spray is yielded to manure the ground, and distributed in annual layers evenly over the floor of the covert.

4. The shade of leaf canopy usefully moderates and retards the decay of the fallen leaves and organic refuse.

5. The sun's rays being intercepted, the growth of weeds and grasses is prevented or checked.

6. Leaf canopy being necessarily accompanied by a rather close juxtaposition of the trees, the action of violent winds is tempered, and they are hindered from carrying away leaves and useful gases.

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* "*Elements of Sylviculture*," *Price* 5s., *London*, *William Rider & Son*, 14, *Bartholomew Close*, *E.C.*

7. Leaf canopy gradually increases the depth of the top-soil by the deposit of vegetable mould, or *humus*, under the fallen leaves.

8. Leaf canopy has a favourable effect on the looseness and porosity of the soil.

9. With leaf canopy there is less necessity for artificial pruning, and the shafts of the trees grow straight.

Close order of trees, with the consequent leaf canopy and shade, seems, then, to be enjoined on the forester, in the first place, in order that he may utilize to the utmost the area at disposal. On the given ground—unless there are some cogent reasons for a contrary proceeding—there should be raised as many trees as it will well support.

The second argument, which in many parts of the world would be the most important, seems in our humid climate not to have the same imperative force. On the continent of Europe, and in most climates of the world, the preservation and equalization of moisture in the soil is perhaps the most important function of leaf canopy. In England, especially after the cold wet summers of late years, it may seem of only secondary importance. But would it not be premature to assume that our climate had permanently changed ; and to neglect all precautions against warm and dry summers, like that of 1868, which in the natural course of events we may expect to recur ?

The increase and even distribution of fallen leaves and tree droppings is most beneficial to the soil. These form the only manure which, in the present state of science as applied to forestry, can be bestowed on the forest soil. The under layers of fallen leaves rot slowly under the shade, and form a rich black vegetable mould, or *humus*, which improves the contents, the consistency, and eventually the depth of the top soil. In some rare instances, under very dense canopy, cases have occurred, particularly in Beech-woods, where the deposit of leaves almost knee-deep was so excessive as to become injurious. This would easily be corrected by bolder thinnings. Letting a little light in on the leaves would soon rot them and stimulate the stagnant growth of the Beeches. The beneficial effects of leaves and tree droppings decomposing under a complete, but not too dense, canopy cannot easily be overrated.

Complete leaf canopy has thus a great influence on the decaying leaves which it has itself shed and supplied. If the leaves were allowed to rot very quickly they would not add so much to the soil ; but under complete shade they decay slowly, forming rich black *humus* and useful gases.

With reference to weeds, attention must first be given to some questions raised by Mr. D. M'Corquodale last month. The deterioration of soil which has been overrun by weeds is manifested in a retarded growth of the trees, and sometimes by the spontaneous appearance of still more unwelcome classes of weeds. Finally, deterioration manifests itself, when the crop has been removed, by a difficulty in renewing the covert, amounting sometimes to the impossibility of restoring wood of an equally high and exacting class. Hardwood may, for instance, have to be succeeded by coniferous kinds, or Larch may have to be followed by Scotch Pine. As to the sentence quoted, it is unfortunately capable of a rather wider interpretation than was intended, owing partly to haste and partly to the desire of making a forcible statement. The idea in the mind of the writer was, that plentiful weeds are at once a sure sign and an active cause of danger to the forest soil. It would have been safer to have qualified the sentence, and written it: 'If the covert be very open, the soil is liable to be deteriorated by exhausting annual crops of grass, brackens, and weeds, and by the other incidents of its exposure.' It is the nature of trees maintained in close order to give back to the soil every year many valuable products, and to improve its qualities in the various ways already indicated in return for the very moderate quantity of mineral substances of which it deprives the ground. Soil producing a hundred tons of saleable timber, say every seventy years, need not thereby be appreciably impoverished. From a table with which Mr. M'Corquodale himself supplied us, in March, 1882, on p. ·787 of the 'Journal of Forestry,' we may gather that of these hundred tons only between one ton and half a ton is composed of mineral substances contributed directly by the soil. The remaining ninety-nine tons and more have their bulk composed of watery and gaseous substances, absorbed indeed from the ground, but originally derived from the atmosphere. The trees, it may thus be calculated, take only a few pounds or stones of mineral substances, or solid ingredients, each year from an acre of ground. On the supposition that each year only a small proportion of soil minerals become dissolved by weathering and the other processes, the available yearly supply of soluble mineral nutriment must be very limited. It must then be extremely prejudicial that any great quantity of weeds should enter into competition with the trees for the mineral necessaries of plant life. Weeds and grasses also promote the evaporation of moisture from the soil, and prevent the dews from reaching it, a point, perhaps, of not very great importance in a moist climate. They also, to some extent, hinder the formation of even and continuous layers of leaf *humus*. Weeds when allowed to decay on the ground must certainly restore some of the useful substances which they had filched; but they do not in general form so valuable a *humus* as tree leaves. Still worse in many respects than the annuals are some of the woody weeds, such as broom and heather. The *humus* produced by decay of heather is the principal ingredient in the impenetrable red moorpan, which gives so much trouble. This is, perhaps, hardly the place for dwelling on the difficulties of renewing a covert where grass and weeds have once got the upper hand, and threaten to overgrow and stifle the young wood plants. The rapid growth of weeds on an extensive bare clearing, with the expense involved in cutting them out and strewing branches to check their growth on the interspaces, affords a powerful argument in favour of renewing coverts under shade of leaf canopy, or in favour of making bare clearings in narrow strips with all possible shade from the side. When a continental forester observes an alarming quantity of weeds on the floor of an advanced covert, he often plants what he calls soil-sheltering wood under the defective canopy. This under-covert can hardly be expected to attain any great intrinsic value, but it protects the continued fertility of the ground, and helps the growth of the over-covert.

The sixth of the advantages claimed for complete canopy and close order of trees was the protection thereby afforded against the winds. The very essential continuance of the fallen leaves where they have dropped is thus effected, and the useful gases evolved in their decomposition are less liable to be wafted away. At very windy points even the close order of the trees may not be efficacious in retaining leaf deposits. Here assistance may be rendered by strewing branches in autumn, and even planting low screens in the form of a hedge. Close order will generally, in an extensive and compact wood, interpose sufficient barriers against wind. Exclusion of cold winds will have the further advantage of maintaining the temperature higher and more equable.

Increase of depth in the top soil will be an extremely gradual process. If, however, leaf canopy effects a hardly perceptible improvement, it is at any rate a great protection against loss. Where the top soil is very shallow it would be dangerous to make a large bare clearing; but renewal of wood can be safely accomplished, though slowly and gradually, under shade.

Looseness or porosity of consistency, allowing tis for the penetration of air through the soil, is a most desirable and valuable quality in soil which is to produce wood. Leaf canopy preserves and promotes this condition of the ground which it shades. The friable black mould formed each year under the deposit of fallen leaves of hardwoods in close order, must improve the consistency of the surface soil and render it more porous. In general, wherever there is close canopy and no removal of fallen leaves or needles, the ground, besides receiving a powdery addition of vegetable mould, will not be compressed by the direct beating and washing of rain and showers, nor hardened and caked under a hot sun.

N. N.

FOREST RAMBLES.

In Denmark.

We are in Sealand. It is mid-October, and over all the noble Beech forests of the northern land autumn is showering her glories of russet and gold. On several mornings of late there has been a keen frost in the open country, and these early forerunners of winter, together with a strong gale from the Atlantic, have caused the foliage to show unmistakable signs of the waning of the year. But, except that the Limes are almost bare of leaves, the gardens of the capital are still trim and bright with colour, the Gladioli, Asters, Pentstemons, Geraniums and Phloxes being but little past their prime.

Leaving Copenhagen *en route* for the forest country, we set our faces northwards, travelling along the coast-road towards the jutting point of Helsingör, known to Englishmen generally as Elsinore, and falsely described in Campbell's famous poem as a 'steep,' it being a low slope of land, partaking in no way whatever of the character of a cliff. The Strand-vei is one of the most beautiful woodland roads to be found in Northern Europe. It is true that it boasts of no hills whence an extended view can be obtained, and that the landscape spread out on the inland side has no background of mountain peaks, and yet its charm cannot be gainsaid. It is a level road of some seven miles in length, bordered on either hand by belts of timber—long lines of Poplars, the foliage of their lower branches still of a brilliant green, whilst that clothing the summits of their tall shafts is of a rich yellow, so that the trees resemble gigantic specimens of the 'Red-hot Pokers' so prized by nurserymen;—wide-spreading Spanish Chestnuts, whose luxuriant foliage is already of a rich russet hue, and whose falling fruit is giving ample occupation to the children of the neighbouring cottages;—great Beeches, with mighty butts, from which at a height of some fifteen feet from the ground a dozen stout shafts shoot upwards, whose myriad minor branches and twigs furnish an umbrageous cloud of light green and golden leaves of which the passing zephyr is continually exacting tribute;—gnarled Oaks, with curiously twisted boughs plentifully covered with acorns;—long avenues of Limes, whose spreading branches, already but thinly clothed with fading leaves, interlace overhead in a maze of glorious colouring against the glowing blue of the sky;—and here and there splendid specimens of the Ash, which, forbearing 'to clothe herself till all the woods are green,' is yet only too eager to lay aside her beautiful raiment when the first frosts of autumn colour the woodlands. Now and again we have delighting our eyes the feathery foliage and brilliant scarlet berries of the Rowan, a valuable adjunct to the beauties of Scandinavian scenery when the year is growing old, and on nearly every cottage wall is a drapery of Virginian Creeper, glowing with tints of crimson, scarlet and brown against the white or yellow plaster.

To the left of the road we get, through the foliage, glimpses of the villas of the Copenhagen aristocracy, nestling amongst shrubberies and woodland gardens, and here and there a stately avenue of Chestnuts or Limes leads up to one of the palaces belonging to the Court. Very charming is the aspect of these summer villas, with their broad green lawns still sparkling with the drenching dews of early morning, their parterres gay with Dahlias, Asters and Geraniums, and their numerous windows commanding superb views over the farm-land and lightly-timbered country to the Baltic, whose steel-blue plain, stretching away to the horizon, is flecked with the white and grey sails of a hundred fishing-boats and coasting craft, and the tall canvas of many a large timber-ship hailing from the ports of the Gulf of Bothnia.

Forest country opens out before us at last, as, after passing through a fishing village of the neatest little cottages, their windows prettily curtained and gay with flowers, and their gardens shaded with whole acres of nets hung up to dry, we come to Klampenborg and the south-east corner of the Dyrehave. Forest country, it is true, but a park by courtesy. A national park indeed; a tract of forest set apart for the use and delectation of the people after a fashion which has been judiciously followed by the United States in connection with the Yosemite and Yellowstone] Valleys, and the groves of Big Trees on the western slopes of the Sierra Nevada. And it may fairly be questioned whether any nation can boast of a more beautiful tract of primeval forest country thus inalienably retained in all its natural grandeur than the seven square miles of undulating, heavily-timbered land which stretches away to the north and west from the bay of Klampenborg. The southern portion, extending over an area of some four and a half square miles, is a Royal preserve, and is bounded by a small river, and it is here that the finest specimens of timber trees are to be found, as also the most beautiful views. Two or three good roads run through the forest, and there are numerous woodland walks and dim trails which invite exploration of its recesses.

A grand grove of Beeches extends north and west from the margin of the blue bay at Klampenborg, and it is by reason mainly of these forest trees that the Dyrehave is celebrated. One sees many fine Beeches in England, but never in any country have I come across the large groves of magnificent trees that are to be found here. Though not standing far apart like the grand Oaks which are the pride of our English forests and parks, these Beeches have huge butts, and the trunks of many of them run up to a considerable altitude before developing branches. I do not think that I over-estimate the height of the finest specimens in placing it at one hundred and thirty feet. They are very fully foliaged, and the largest of them have an enormous spread of branches, covering an area but little smaller than that overshadowed by one of our finest English Oaks. Their foliage gives signs of autumn frosts and gales, and its various tints of light green and gold are exquisitely beautiful as the sunshine filters down between the leaves. Passing through a splendid grove of Beeches for a quarter of a mile, we come upon a small forest of Scotch Firs, diversifying the landscape with their tall ruddy trunks and sombre black-green needles high up against the blue. Beneath their shade there is no undergrowth, and the scanty turf presents an uniformly brown appearance owing to the thick carpet of fallen needles. But the forest generally is somewhat bare of undergrowth or scrub, though the bracken grows knee-high in broad tracts here and there. Autumn is not the time for flowers, and the purple blossoms of the *scabius* alone meet our eyes, whilst of ferns we notice but two or three common varieties.

Emerging from dense forest, open glades of thick turf are before us, and scattered about, both in clumps and as solitary trees, are many fine Oaks, and some particularly large Thorns, literally crimson with haws. To the eastward the ground slopes away to the Baltic, and here the Thorn trees are especially numerous, the gnarled and twisted trunks of many of them—in several instances appearing to be from eight to ten feet in circumference—testifying to their great age, whilst from thirty to forty feet would seem to be no unusual altitude. Diversifying these glades are belts and masses of thick forest such as I have already described, extending in places over several hundred acres—the russet of the Oaks and Chestnuts, the gold of the Beeches and Birches, and the sombre green of the Pines and Firs filling the hollows and swelling up over the hills in bold sweeps of colour, intensified here and there by the crimson foliage of the Wild Cherry and the vermilion of some heavily-fruited Rowan. The grey-green herbage of almost every dell—for it shows traces only too plain of early frosts—is dotted over with red and fallow deer in large herds, the total number of head in the Royal forest amounting to several thousand. One splendid stag, standing motionless on a ridge in the woodland, his grand symmetry and towering antlers clearly cut against the sky, especially rivets my gaze. He is intently looking seaward at an angle to my position, and apparently did not sight me as I gained the summit of the adjoining hill. I watch him for several minutes ere he tosses up his head and disappears into a neighbouring glade, and must confess that during that short interval my fingers clutched my stick nervously, longing as I did to be able to transform it into a trusty rifle. He is almost snow-white in colour, and has the appearance of a veteran amongst stags.

Here and there are small lakes, one or two of which are picturesque enough to please an artist's eye, with woods running down almost to the water's edge, and reedy margins where in winter one may expect to flush a string of duck, and, may be, add to one's bag some rare northern bird. Close by, too, are small tracts of what looks like peat-bog, likely enough to harbour a wisp of snipe. Striking inland and emerging from the wilder part of the forest, we come upon the Hermitage, a Royal hunting pavilion, commanding grand views over the Baltic to the distant coast of Sweden, as well as inland over farm country interspersed with belts of timber. A charming summer residence this, and one which, had the King fewer palaces at his disposal, would probably not remain unoccupied.

This grand forest possesses so many charms for the lover of woodland scenery, that it is with regret we are unable to devote more than one day to the exploration of its recesses. It has all the characteristics which combine to make a forest beautiful—noble timber trees—here in dense masses, there in isolated specimens; lovely glades of rich herbage, hills and valleys, lake and stream, and a superb stretch of sea with a coast-line bounding the horizon. Its charms are so numerous and its views so varied, that the undulating woods of Frederiksdal, gorgeous as they are with similar autumn tints, the pretty lake of Furesjö embosomed amongst them, and the huge Beeches and Chestnuts of Sorgenfri, past which we journey back to the capital, appear tame in comparison with the beauties of the Royal forest.

A. G. Guillemard.

WOODS AND FORESTS OF PERTHSHIRE.

MR. Thomas Hunter, the well-known Editor of the *Perthshire Constitutional and Journal,* has laid all tree lovers under great obligation by the publication of his recent and beautifully illustrated book.* The attempt to give in a review, unless it be a review of inordinate length, a fair reflex of Mr. Hunter's pages we at once renounced, on looking at the volume, as an impossibility; and this circumstance is in the highest degree complimentary to the author, for the book is a monument of industry. We could fill this Magazine with interesting extracts containing a mass of elaborate and detailed information of a kind especially attractive to our readers, and yet fail to give more than a small part of its contents, or even to do justice reflectively, so to speak, *i.e.*, representatively—to the rest.

We must therefore be content to indicate briefly the general nature of the chapters, premising that each one is crammed full of information of almost every conceivable kind relating to the subject of the work.

Comprehensive as the title is, it is amply justified by the nearly 600 pages of closely though excellently printed matter.

Beginning excellently with a remark on the solemnizing influence of woods, in which occurs the passage that 'The beautiful appearance which woods give to the landscape of a country, and the part they play in the economy of Nature, render the study of them one of the most pleasing and interesting themes that can engage our attention,' the author goes on to discuss their effect upon the landscape, their climatic influence, and their commercial importance. Then reverting to the particular locality—Perthshire—intended to be dealt with, he commences an account of what must strike the reader as a singularly complete record of every point of interest. The past and the present are compared, the extent and character of the county, its ancient continuous forests, the destruction of these, their remains, the destruction of its woods during feudal times, the efforts at improvements, compulsory planting, the acreage at present under wood, and the pecuniary value of this wood. Then follows accounts of the Perth nurseries, of Athole, of Dalguise, Murtly, Dunsinane, Scone, Lynedoch, Logiealmond, Methven, Moncrieff Kilgrasteon, Inveraray, Freeland, Rossie, Condie, Duncrub, Garvock, Gask, Dupplin, Abercairny, Blair—Drummond, Ardoch, Keir, Kippendaire, Monteith, Strathallan, Drummond Castle, Stobhall, the

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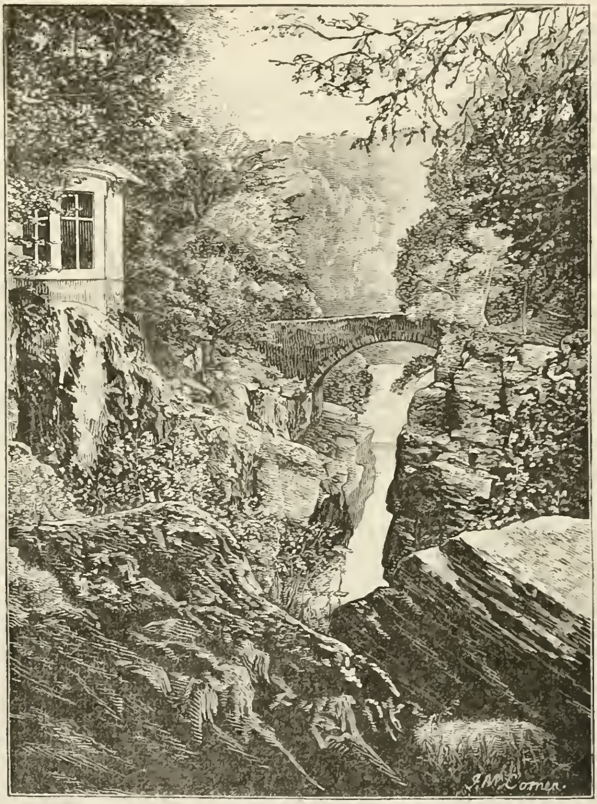
* 'Woods, Forests and Estates of Perthshire, with Sketches of the Principal Families in the County.' By Thomas Hunter, Editor of the *Perthshire Constitutional and Journal.* Illustrated. Perth: Henderson, Robertson and Hunter; Edinburgh: William Brown; Glasgow: Thomas Murray and Son. 1883.

Cairnies and Glenalmond, Gorthy, Meikleour, Taymouth, Castle Menzies, The Black Wood of Rannoch, Dunalastair, Glenlyon, Octertyre, Lawers, Strowan, Dunira, and Carse of Gowrie, &c.

The immense amount of information as to trees of all kinds, accompanied as the accounts are with minute admeasurements and every possible topic of interest connected with woods and forests, make the book one of exceptional value.

From its delightful pages, so admirably illustrated, we should much have liked to extract many a paragraph, but we must content ourselves with one, which will give an example of the author's pleasant style and genial manner of treatment. It relates to the famous Beech hedge on the Perth and Blairgowrie Road :—

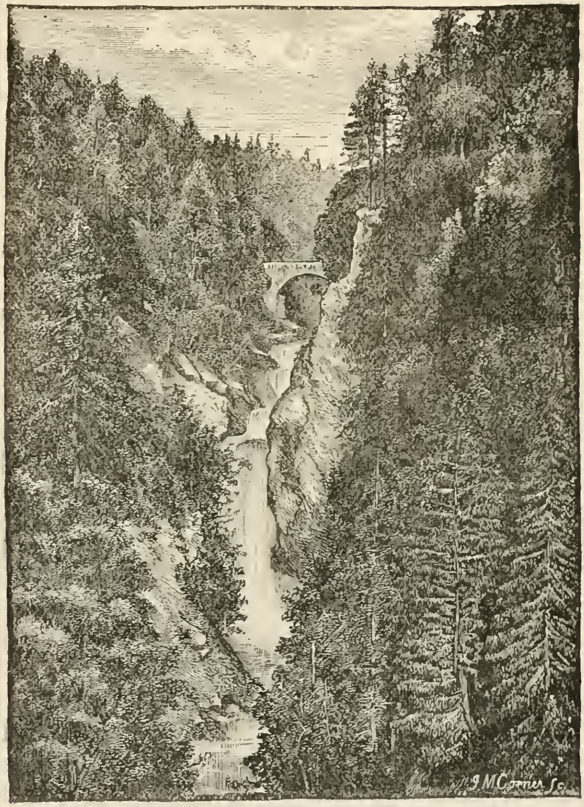


HERMITAGE FALLS.

'Leaving the policies on our way to the famous Beech hedge on the Perth and Blairgowrie Road,' says Mr. Hunter, 'we pass through the interesting village of Meikleour, nestling amidst the woods a little to the north-east of the mansion. In ancient times the village seems to have been a centre of rural merchandise, as

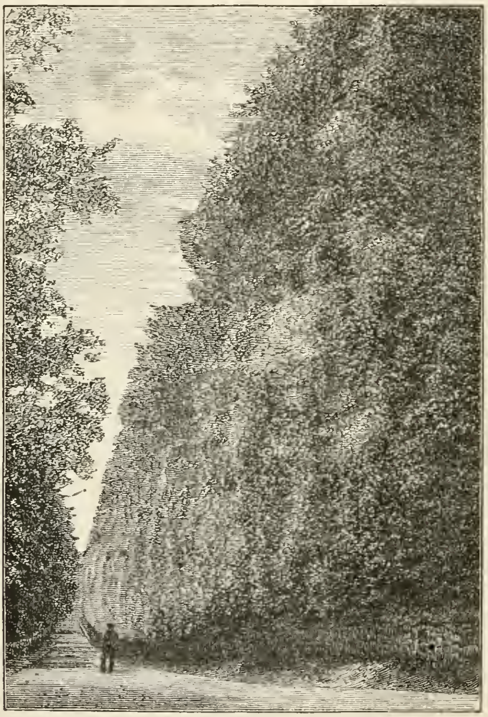
THE LAST OF "GREAT BIRNAM WOOD."

the Tron for weighing wool and other bulky articles still stands in the old market-place, with the jougs attached, to which offenders used to be fastened. The ancient cross, bearing the date 1698 (the second and last figure, however now broken off), also stands in the centre of the village square, with a neat iron railing round it. The village itself is one of the most beautiful in Perthshire, and its proximity to the great Beech hedge, which may justly be described as one of the arboreal wonders of the world, gives it an air of some little importance. This hedge is so remarkable that parties have been known to travel from the most remote parts of the country for the express purpose of seeing it. The trees composing the hedge, which is neatly trimmed, reach an average height of about 80 ft., and the length of the hedge is 580 yards, or exactly one-third of a mile. Throughout its entire length the hedge is as compact and perfect as it could possibly be, and looking down upon it from the corner of the road leading to the village, it appears as a great arboreous wall, shutting out everything behind it, and extending as far as the eye can reach. The hedge is believed to have been planted in the year 1746. An old inhabitant, who died about 1878, remembered his father telling him about the building of the dyke in front of the hedge, which was impressed upon his memory by the fact of a number of


J M Corner Sc.

THE FALLS OF BRUAR.

the men engaged in the work having left to take part in the Battle of Culloden, which was fought in 1745. The dyke was completed that year, and, in accordance with the usual custom, the hedge was planted in the following year. The hedge bears evidence of having been annually pruned and trimmed for the first forty or fifty years. For about twenty years afterwards the trees appear to have been allowed to grow wild, until their wide-spreading branches became an obstruction on the highway. For the last fifty years or more the hedge has been regularly cut on the side next the road, but the side next the wood has not been trimmed for thirty or forty years, there being no necessity for interfering with that side. It is absolutely necessary, however, that the side next the road be regularly pruned, and the result of this is not only to keep the road clear, but to give to the row a truly hedge-like character. The operation of pruning the hedge is carried out every five or six years, and, from its great height and extent, the work is one of no ordinary labour and difficulty. The operation, however, is now much facilitated by the adoption of an ingenious, but simple, method, which the Dowager Marchioness of Lansdowne observed in use upon the tall Lime hedges at Versailles. Her ladyship was so much struck by the machine in use there, that she procured a plan of it, and had one constructed by Mr. Scrimgeour, Methven, under the superintendence of Mr. Matheson, the land steward. The machine is simply a double ladder, 30 ft. high, supported on four wheels, and by means of which the heavier branches are cut with a single stroke



THE GREAT BEECH HEDGE AT MEIKLEOUR.

saw. The twigs are then cut by an averuncator to the height of 45 ft. Up to this point the work is comparatively easy, but beyond that height there is not a little difficulty and danger. One of the foresters climbs as near to the top as possible, fastening himself to the strongest branch he can get by means of a belt round his waist, and holding on to another branch by his left hand. With his right hand he wields a light billhook reaching to a height of 75 ft., which is as high as can be trimmed with safety, and which is quite high enough, as the uppermost branches gradually taper towards the apex of the trees. The hedge is altogether the most wonderful thing of the kind in existence. Every tree throughout its entire length is in perfect health, and the height throughout is as uniform as it well could be, the hedge having every appearance of being trimmed at the top as well as on the side.'

Let us add that the illustrations (some of which, by the author's courtesy, we reproduce), the arrangement, printing, and binding of this most useful and valuable book (which should be in every library) are all that could be desired.

'HEATH'S FERN PORTFOLIO.'—Messrs. Sampson Low, Marston & Co., are about to publish what 'has never before been attempted,' says the *Times*, 'namely, a Fern Portfolio, or series of absolute *facsimiles*, life size, of ferns which, in form colour, and venation, will follow nature. The parts will be issued monthly, and each plate will bear upon it the letterpress description of the plant, including its habitats and distribution.' The plates will be 15½ by 11½ inches, so that a considerable portion of moderately-sized specimens even of the largest fern fronds can be represented life-size; whilst entire figures, natural size, of smaller species, can be given without curtailment and with their general form, outlines, venation and colouring given with absolute fidelity to nature. Though each plate will be named, the series will not be consecutively numbered, so that any sufficient number of plates will make a volume, the completeness of which will not be marred by the omission of particular parts.

MR. R. B. LAIRD, of 17, South Frederick Street, Edinburgh, announces that he has acquired the goodwill and whole business carried on by Mr. John Downie and himself for upwards of thirty years under the style of 'Downie and Laird, Nurserymen and Seedsmen, the first named retiring from the firm. Mr. Laird has also taken into partnership his son Mr. David P. Laird, and they will continue the business as 'R. B. Laird and Son,' at above address.

ERRATA.—In the report of the proceedings at the annual meeting of the Scottish Arboricultural Society in our last issue, we are requested to state that the treasurer's statement, at page 43, "Discharge—£9 for prizes"—was only the prizes paid in *money*, and does not include medals and prizes in kind, whichappear in the medallist's account.

In our list of newly-elected members of the Scottish Arboricultural Society last month we gave the name of Sir John Forrest; this should have been Sir William Forrest, Bart. The name of Colonel Morton, of Morton Hall, Edinburgh, was also accidentally omitted.

BEAUTIES OF BRITISH TREES.

POPLARS.—As we have previously seen 'JOURNAL OF FORESTRY,' vol. v., p. 854), there are five common members of the genus *Populus*: the Abele (*ib.*, p. 699), the Aspen, the Grey, the Black, and the Lombardy Poplars. Of the two former of these we have spoken before, so that we have now to deal first with the Grey Poplar (*P. canescens*), a close ally of the Abele, and, like it, belonging to the section *Leuce*, the first of the two into which the genus is divided. Like the whole of the Willow family, the Grey Poplar is a tree with alternate leaves, furnished with stipules, and having its flowers clustered into catkins, made up of scaly 'bracts,' some trees bearing only staminate, or male, and others only pistillate, or female, ones. As, too, in all the order, there is no true calyx or corolla to the flowers, but in all Poplars their place is taken by a little one-sided cup or 'disk,' springing from the base of the scale or 'bract,' between it and the axis of the catkin, *i.e.*, in what is termed the 'axil' of the scale. As, too, in all Poplars, these scales are slashed into several lobes, and the catkins, made up of them with the flowers in their axils, are drooping and generally make their appearance before the broad deltoid leaves. The Grey Poplar is, perhaps, seldom so large a tree as the Abele, though its timber is said to be of better quality. It grows sixty or seventy feet high, with a smooth, dull grey bark, spreading branches drooping gracefully in old trees, and abundant suckers. The Poplars form one of the exceptions to the rule—often stated without qualification in botanical text-books—that roots do not produce leaves or leafy shoots. This characteristic is most obvious when one of these trees has been felled; for then all the vitality that before spread from the roots into the main stem is diverted into the far-reaching lateral roots, and a small forest of suckers spring up, often many yards from the parent tree. These are true root-suckers and not merely ascending subterranean branches, like those of the Rose. In Poplars the leaves on these suckers are often different in form from those on the branches of the tree: thus, in this species, the former are more angular and toothed, whilst the latter are roundly heart-shaped and generally hoary on their under surfaces. It is not until the end of April, or even well into May, however, that their leaves are fully expanded; so that not till then can we speak of

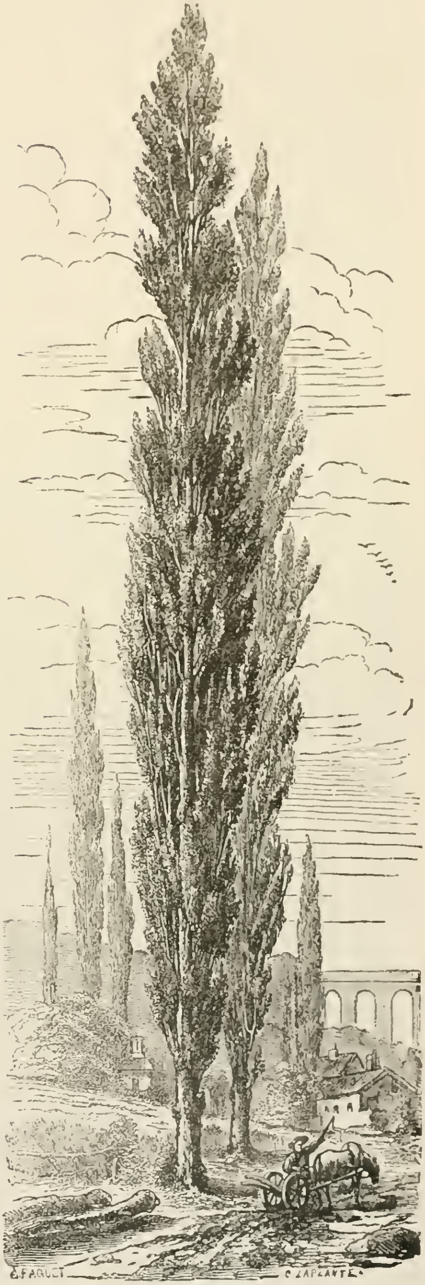
> ' 'Blasts that blow the Poplar white,'

as these hoary leaves glint in the rays of the spring sun; and at an earlier period in the year we can note many of the Grey Poplars' distinctive marks.

The young shoots are downy and so are the leaf-buds; but the latter are not sticky as are those of the Black and Lombardy Poplars, and, to some extent, those of the Aspen. It is in March, that 'roaring moon of daffodil and crocus,' that the catkins make their appearance; and, as with the male flowers of so many trees,

> 'In the wind of windy March,
> The catkins drop down,
> Curly, caterpillar-like,
> Curious green and brown.'

In these catkins the scales are delicately fringed with hair, and in each flower are from six to ten purple anthers; whilst in the shorter and more persistent female catkins that have to remain on the tree until the seed be ripe, each flower has two wedge-shaped purple stigmas divided into three or four lobes. This last is a distinguishing point between the Grey Poplar and the Abele, which has its two stigmas yellow and each divided deeply into two segments which have parallel edges and are not wider at one end, so that they appear like the arms of a cross. These may seem minute points, and are certainly not very practical so far as ease of ready observation is concerned, nor can we see clearly the advantage to the tree of having stigmas of one shape or colour or of the other; but botanists repeatedly find



POPLARS.

that it is just these minor and physiologically unimportant characters that are the least subject to variation, and are, therefore, the most trustworthy means of discriminating allied forms.

In autumn all the Poplars have a nearly equal charm. Late in their Spring frondescence, they are late also in losing their leaves. These cling through the equinoctial gales of October, and are often seen bright with an almost spotlessly clear lemon-yellow, or variegated, perchance, with a green clearer than any hue they have hitherto worn, in the fitful sunshine of St. Luke's summer, or of that autumnal after-glow that sometimes marks the latter half of the month.

For its spreading boughs bearing delicately-poised broad plates, now of green and grey, and now of this clear gold, the Grey Poplar is well worthy of a place with the Abeles and Aspens by the water-side, on the tree-grown islet in the lake, or in the belt of trees beyond the shrubbery.

The Black Poplar (*P. nigra*), and its 'fastigiate' variety, the Lombardy, belong to the second section of the genus *Aigeiros*, characterised by the smoothness of the young shoots, the stamens being generally more than twelve and often as many as thirty in a single male flower, and the stigmas short, wedge-shaped, and deeply two-cleft. The former is a rapid-growing tree, reaching fifty or sixty feet in height, with a straight stem, spreading branches, grey bark, and a soft spongy white wood, which is used for charcoal and for ornamental carving. The bark also is useful for tanning, so that it is a tree that it may be sometimes remunerative to plant for profit; but, like most rapid-growing, soft-wooded trees it does not live long. It grows in moist situations; but is, perhaps, not truly a native of Great Britain. Its buds are smooth but sticky, and its large leaves, on slender petioles, compressed like those of the Aspen, taper to a point, are finely toothed at their edges with rounded serrations, and are at first silky on their under surfaces and margins, but become ultimately smooth and almost uniform in colour above and below. It is this absence of grey hairiness on the leaves that has earned for the tree its inappropriate name of 'Black,' as opposed to the White and the Grey Poplars. It has no suckers, a fact which may recommend it for planting near lawns, or in other situations where they might well be objectionable. In this respect it differs remarkably from the Lombardy Poplar (*P. fastigiata*), which is, however, generally considered by botanists to be a variety of it, though no doubt a more permanent and well-marked form than is the Irish or Enniskillen Yew, as compared with our common Yew.

The Lombardy Poplar is believed to be a native of the mountains of Western and Northern Asia, and was only introduced from Italy to England in 1758; but the artistic use of its 'fastigiate' spires, its vertical, or nearly vertical branches, tapering upwards higher than most of our trees, seems to have been instinctively recognised at once.

'The Poplars in long order due.'

may have a somewhat formal effect if we look at them apart from the landscape, in a near or confined view. They then appear simply as a stiff row of from three to a dozen (they are seldom more and should not be less) trees, incongruous in outline with those around them, and suggesting nothing so much as those red-stemmed, green-chip marvels of the German toy-box of our youth. The beauty of

LOMBARDY POPLARS.

the Lombardy Poplar is mainly one of landscape effect. True, the golden tints of its young foliage, now yellow, now brown, now russet-red, before it decides on being a dull green, may cheer the topmost window of a lofty London house; but properly it should never stand alone and should always be so placed that the row of vertical green plumes may serve to break or to contrast some horizontal line—a river bank, a road, an unsightly railway embankment, or the arches of a viaduct or aqueduct, as in the annexed wood-cut.

Its suckers form an objection to the planting of the Lombardy Poplar near the lawn; but on artistic grounds also, it is desirable that it should be planted in a row at some distance from the house or other point of view.

The Privet (*Ligustrum vulgare*) is so generally well-known a shrub that but little need be said in pointing out its beauties.

It affords a remarkable instance of the transference of names from one thing to another that characterises popular, as opposed to scientific, nomenclature; for it was originally called 'Primrose.' This name was originally 'primaverola,' the Italian diminutive from 'prima vera,' *i.e.*, the first flower of spring. This became in French 'primeoerole,' and in early English 'primerole' and 'primerolles,' from which stages we get both the Latinised 'primula,' and by a false etymology that has often affected our spelling, 'primrose.' In that most valuable English-Latin Dictionary, the 'Promptorium Paroulorum,' written by Geoffrey the Grammarian, a Dominican, or Black Friar, at Bishop's Lynn, in Norfolk, in 1440, it is entered as, 'Prymerose, primula, calendula, ligustrum.' Turner, in his 'Libellus de re Herbaria' says decidedly '*ligustrum arbor est non herba ut literatorum vulgus credit; nihil que minus est quam a Prymerose*,' *i.e.*, the ligustrum [of the ancients] is a tree and not a herbaceous plant, as the great mass of scholars believe it to be, for it is nothing less than a Primrose;' whilst a little later honest old Thomas Tusser, in his 'Goode Pointes of Husbandrie,' speaks of it as 'Privey or Prim,' and Gerard calls it 'Privet or Prim Print.' This last name is explained as *prime printemps*. Though Shakespeare apparently always alludes, under the name of Primrose, to the plant now so called, as late as 1657 we find William Coles, in his 'Adam in Eden,' applying that name to the shrub.

The Privet belongs to the same natural order as the Olive, the Ash and the Lilac, and is more distantly related to the Jasmine. The whole order consists of trees and shrubs giving off their leaves, and consequently their branches, in opposite pairs, and having flowers that are mostly small, but clustered together in *trichotomous cymes*, *i.e.*, on flower-stalks springing in threes from one point, and often branching repeatedly in the same manner. They thus gain collectively the conspicuousness that they would not have singly. The flowers are very regular, consisting of four small sepals united into a cup, four petals also united, but in varying degrees, sometimes forming a long tube; two stamens, generally represented by anthers only, inserted upon the corolla-tube, and two carpels united to form the berry, capsule, or samaroid fruit. Our native Ash is exceptional in the absence of both calyx and corolla, and the five sepals and petals usually present in the Jasmines, form the most obvious distinction between the *Jasminaceæ* and the *Oleaceæ*.

The latter Order, which is not a large one in point of the number of its species, is mainly represented in northern temperate latitudes, the genus *Ligustrum* being confined moreover to the Old World. Several of the few species it contains are natives of Japan, that home of those evergreen shrubs that rejoice in a typically equable or insular climate; and it is perhaps the nearly evergreen character of our British species, that enables it to flourish amid the smoke and soot of London. The leaves, it is true, become blackened and choked, and perhaps fall off sooner than they would in clear country air; but there are some on the tree during so many months of the year, that if its growth is slow it is almost continuous.

It has every appearance of being wild in our woods to the south of Durham, and in the south of Ireland; but is only naturalised in Scotland. It grows from four to ten feet high, and the suppleness of its slender, smooth-barked branches very probably gave it the name *Ligustrum*, from 'ligare,' to bind. Patient of the shears, it has long been a favourite for garden hedgerows. The botanical student should notice between the thin, brown cork-layer of a year old shoot the rich green colour of the 'phelloderm,' or chlorophyll containing layer of bark.

Both the bark and the oblong-lanceolate leaves were formerly used in medicines for their bitter astringent character, and a rose-coloured dye and an oil have been extracted from the berries; but it is certainly mainly as a hedgerow shrub that the Privet is of any real value.

The tint of its leaves is never beautiful, being perhaps fairly designated as dull; but they are more cheerful in hue than the blue tinted foliage of the *Laurestinus*, which is to some extent the rival of the Privet, and I would venture, on account of these despised yellowish green leaves and the white clusters, that appear among them so abundantly in June and July, to put in a plea that the Privet may be sometimes allowed a place untrimmed among the laurels and other high-grown bushes in the shrubbery. I have a lively recollection of high hedgerows gay with these dense white clusters, seen in county Waterford some years ago.

The short funnel-shaped corollas are succeeded by the blackest and glossiest of round berries; but these soon lose their gloss and with it any beauty they may have; so that I think it must be admitted that the beauties of the Privet are summed up in the freedom of its branching in a most irregular bushy form, the persistence of its not unpleasantly coloured foliage and its dense clusters of white blossoms. Were they as hard, it cannot be denied that some of its Japanese congeners exceed our European species in many points of beauty; but we are not concerned here with any but native trees.

G. S. BOUGLER.

THE SAP OF THE BIRCH.

An interesting observation, says, a recent number of *The Lancet,* of much importance in the cause of vegetable physiology, has been communicated by Professor Attfield at a recent evening meeting of the Pharmaceutical Society. A slender white Birch tree, with a stem which at the ground is only 7 inches in diameter, having a height of 39 feet, and before any foliage had developed, would appear to be able to draw from the ground about seven-eighths of a gallon of fluid every twenty-four hours. That, at all events, was the amount collected from a branch with its transverse section exposed to the atmosphere. The collected sap was a clear bright watery fluid, of a specific gravity of about 1002·5, and containing not quite 1 per cent. of sugar. The liquid also held in solution a ferment capable of converting starch into sugar. When exposed for some time to the air it became charged with bacteria, the sugar being replaced by alcohol. That the Birch sap contains sugar is known to the peasants of many countries, especially Russia; and a kind of 'Birch wine' is manufactured by permitting the fermentation of the saccharine juice. The obscurity which still surrounds the science of the circulation of fluids in plants was rightly the subject of some remarks by Professor Attfield. In the course of the discussion which ensued Professor Bentley said that at this season of the year, before the leaves were expanded, the reserve materials largely stored up in the roots were undergoing active chemical changes; this state was associated with an increasing density of the fluids of the part, and the consequence was that an excessive osmotic action took place. There was far more fluid absorbed from the earth than the tree could use, and what botanists call 'root pressure' took place. This was a matter that had not been clearly explained until the last few years; it had nothing to do with the leaves. The 'bleeding' did not occur at any other time of the year, for as soon as the leaves were fully developed, the fluid which was absorbed by the roots was naturally carried up the tree and became transpired, and thus dissipated. Probably the ascending sap had greater force in summer, but the tree did not 'bleed' when incised, for the foliage carried off the fluid. We quite concur in the wish expressed by Professor Attfield that if there had been time he should have liked to have asked Professor Bentley to explain further what 'root pressure' was. It seems at first sight to be a downright *petitio principii*; but if, as Professor Bentley remarked, the density, or, perhaps better, the tension of the contents of the roots were much augmented as the result of intimate chemical changes, then a partial explanation might be said to be afforded.

SOME OF THE CHARACTERISTICS OF SOILS.

IN last month's number of 'FORESTRY,' Mr. D. M'Corquodale calls in question a recent remark of one of your contributors to the effect that the annual growth of 'grass, brackens, and other weeds,' in plantations is liable to further the exhaustion of the soil in such places, and he slyly suggests that if the grasses and weeds bring about exhaustion, the growth of 100 tons of saleable timber to the acre must be a serious matter to the soil. But such short and close herbage as 'grass, brackens, and other weeds,' if allowed annually to wither and decay where it has grown, adds considerably to the fertility of the soil; and land under timber stores up each year in the surface soil the food constituents most required by our cropping plants. And this we shall endeavour to make plain. Out of the sixty-four yet known elements that together go to form our earth, sea, and air, only some twelve or so are found in the analyses of plants, and of course these must be present in company with other matter in all soils capable of sustaining vegetation. Of some, however, the plant requires but little, while of others it has to absorb a considerable amount. Those few elements combining one with another, or one with several, and in various proportions, go to form the many different compounds which are required to constitute a soil fit for cultivation: oxygen and hydrogen unite to form water, hydrogen and nitrogen to form ammonia, calcium and potassium each unite with oxygen to form respectively lime and potash; carbon, nitrogen, and phosphorus unite with water severally to form carbonic acid, nitric acid, and phosphoric acid; and these three with lime, potash, and soda to form the carbonates, nitrates, and phosphates of the latter three, and so on. And out of those few the vegetable kingdom elaborates innumerable substances ranging from simple starch to the subtle poisons of the alkaloids. The plant cannot lay hold of and assimilate to its substance any one free and uncombined element, unless perhaps we except the free oxygen of the atmosphere; when the plant is under certain conditions of growth it cannot avail itself of the free nitrogen of the surrounding air. Nor can it absorb any uncombined carbon—the element that forms the great bulk of the plant. Carbon when by itself is a solid and almost insoluble, but combined with oxygen it forms carbonic oxide, a gas, and plentiful in the atmosphere. Under certain conditions, owing to some mysterious action of sunlight on the green colouring matter of the tender parts of plants, the plant is able to decompose this oxide by which it is surrounded and to turn the carbon to its own uses, and also to avail itself of the free oxygen if required.

Thus carbon, and oxygen, and watery vapour too, which can penetrate the delicate outer membranes, are all the substances the plant is able to obtain by means of its leaves and other exposed parts. The rest of its food it must take up by way of its roots. The greater volume of the water it requires is taken up through those channels and it carries with it what it is able to dissolve from the soil. But the active or absorbent parts of the roots have the property of so acting on some matters required by the plants which are insoluble in water that they can pass through the absorbing cells and vessels into the sap or general circulating medium of the organism. The potash, lime, soda, and magnesia required are taken up by the roots in the forms of the nitrates, sulphates, phosphates, carbonates, &c., of these bodies, and at the same time the requisite nitrogen, sulphur, phosphorus, and additional carbon to what it can otherwise obtain, passes into the sap. The plant's supplies of nitrogen, phosphorus, and potash, and perhaps lime as well, though to a less extent, are the most precarious, because these are the scarcest of the essential substances of plant food in soils. Enough of the other substances required by the plant are contained in all ordinary soils, and the agriculturist need not trouble himself over them. Of the four mentioned, nitrogen is the most valuable, it being the least available ; in fact, the amount of nitrogen available as plant food in any soil is the measure of its fertility. The element is abundant enough, for our surrounding atmosphere is composed four-fifths of free nitrogen, but then it is one of the most inert of all the elements, and least inclined to combine with others. Under certain natural conditions, combination with others is brought about. The intense heat of lightning flashes causes union between the nitrogen and other elements in the atmosphere. Thus it comes that ammonia and nitric acid can be detected in the air. These are extremely soluble in water, and rain carries them to the soil. From this source alone each acre of soil gets annually something like 7½ lbs. of nitrogen. All organic matter—remains of animal and plant life,—contains a large percentage of it, and this finding its way to the soil increases the latter's supply of nitrogen. Coal, peat, deadwood, leaves, dung, &c., contain it in abundance. But it is only when nitrogen is in combination as nitric acid that plants can assimilate it to themselves, and, as we have already said, by way of their roots. Plants cannot make use of the insoluble compounds containing nitrogen in the soil, but by a wonderful provision of Nature, the nitrogen of those bodies is made available to them. This is accomplished through the means of a minute fungoid organism, whose economy in life seems to be that of attacking the nitrogen of insoluble bodies, and of ammonia as well, and bringing it into combination as nitric acid. Given a due temperature, a fair amount of moisture, and sufficient organic or other matter containing nitrogen, and the presence of lime or some other base with which to neutralise the acid as it formed, and the process goes on untiringly. In early summer it commences with us, and it continues far into autumn. The nitrates are so soluble that unless they are speedily taken up by growing plants they soon find their way to the drains, for ever to be lost to the fields from whence they originated. Phosphorus is rather scanty in soils, and though there is enough in the majority of them for the uses of natural herbage, the growth of cultivated plants necessitates the bestowal of large quantities of phosphates on land under tillage. Potash is not usually so scarce, for it enters largely into the composition of most of the rocks that form the basis of soils, and as disintegration and decomposition proceeds, fresh stores of it is being placed at the disposal of plants. Experiments on the absorbent powers of soils have revealed the strange fact, that when solutions of potash such as the nitrate, sulphate or carbonate, are poured on soil and allowed to filter through it, they have the property of arresting, as it were, the potash of any of these salts and substituting lime or soda in its place. Where, however, neither of these alkaline bases or any others are available to act the part of the potash in neutralising the acid, the solutions pass through unaltered, and the potash is found in the filtrate. Soils act similarly with solutions of ammonia, having the power of arresting this most soluble body and preventing its escape to the drains before it has taken part in the neutrifying process before referred to. Hence it follows that lime, besides acting directly as a supplier of food to plants, performs many useful offices in the soil. It acts as a base with which to neutralise the nitric acid produced by the minute fungus already mentioned, thus saving the less plentiful potash and ammonia for the uses of the plant; and in like manner it neutralises the acids of the soluble phosphates which are nowadays so much used by farmers, and enables the latter to obtain the full good of them. Before the plant has time to seize on the soluble phosphates freshly bestowed on the soil, the free acids they contain have attached more lime and once more become insoluble, but afterwards they are precipitated in such a finely divided state, that the rootlets of the plant can easily absorb them. Were lime not available, the accumulation of free acids in some soils would soon come to act prejudicially on the welfare of the plants which the farmer thought to encourage. Without its presence and use, the quickened decomposition of soils full of such inert organic matter as peat, is almost impossible. Other bases—potash, ammonia, or soda—may perhaps be available, but the first two are too valuable to be allowed to serve such purposes as the cheaper and more plentiful lime can even more efficiently perform. Comparing the composition or the analyses of the ordinary crops of cultivation with that of wood, we can at once see why it is that timber acts decidedly in the way of increasing the fertility of the soil and not towards its deterioration. Some tables in a recent little book on 'Agricultural Chemistry' by Mr. Warington, which we have by us at present will sufficiently answer the purpose. From these we learn that a crop of wheat yielding 30 bushels to the acre, and with its straw included, requires from the soil within that area 45 lb. of nitrogen, 22·7 of phosphoric acid, and 27·9 of potash; and a 30-bushel-to-the-acre crop of beans, 99 lbs. of nitrogen, 31·5 of phosphoric acid, and 81·1 of potash. A two-ton crop of clover hay will take from each acre 102 lbs. of nitrogen, 25·1 of phosphoric acid, and 87·4 of potash. Seventeen tons of turnips, 22 of mangels, and 6 of potatoes, all with their respective leaves and stems, will absorb 120, 147, and 67 lbs. of nitrogen, 33·1, 49·1, and 26·8 lbs. of phosphoric acid, and 148·8, 262·5, and 76·5 lbs. of potash from their several acres of soil. Unfortunately the amount of nitrogen in a season's increase of Pine and Beech wood quoted is not given, but Mr. Warington writes that a year's increase of Pine timber is 'produced with a consumption of only 2½ lbs. of potash, and 1 of phosphoric acid per acre per annum; with Beech timber the quantities required are rather larger. The nitrogen contained in timber is very small in amount, but the actual quantity required by a forest has not been accurately ascertained.' From the foregoing data, we cannot be very far wrong in saying, that a single moderate crop of mangels will extract from an acre of soil almost as much potash as can be required by the annual growths of a forest covering a like area through the long space of a hundred years; indeed, we may say for the lifetime of the trees. And during the same time an acre of forest trees will only require the use of twice as much phosphoric acid as will be needed to serve the purposes of a single crop of the roots in question on an equal plot of ground. The figures reveal also the necessity that farmers are under of manuring liberally in order to insure large returns, and show the advantages that result from a judicious rotation of crops, and the need there is in many cases to restrict the removal of certain crops to be consumed at a distance from the farm, unless some equivalent is to be returned in their stead to the soil. The nitrogen and phosphoric acid, and potash contained in growing trees are concentrated mostly in the leaves and twigs and tender branches—the parts that are seldom removed from forest ground. The roots descend far and feed on the subsoil, eating into and disintegrating the hardest rocks themselves, and they are independent of the surface soil for their nourishment. The leaves fall annually and decay, and thus they gradually come to enrich the surface soil of plantation ground; each year they are adding to it the bulk of the valuable bodies that the roots have extracted from the depths beneath. And at the same time they, and the decomposing parts of the trees that reach the ground, increase the soil's share of its beneficial organic or 'mould, matter—spoken of by some as *humus*. The nitrates of soil occupied by trees are not nearly so apt to be washed out as they are from soil under tillage and underdrained. What of the rainfall in woods that is not carried away in the surface drains is eventually taken up by the trees and evaporated from their leaves. Any nitrates that may find their way to the subsoil will soon be seized on by the roots of the trees, and be once more transferred to the surface. And then again it is questionable whether the process of nitrification can go on in damp and shaded woods. At anyrate, the more it is hindered, the less chance there will be of waste of the gradually accumulating nitrogenous matter. The thinner the trees on the ground, and the drier the soil, the greater likelihood there will be of its proceeding. And these are the places where we meet with 'grass, brackens, and other weeds.' Now it has been found, and we have it on the good authority of Sir J. B. Lawes, that there is far less waste of nitrates from soil continually covered with herbage than from bare soils or those that carry a crop during only certain seasons of the year; that, moreover, there is less waste from a badly cleaned field than from a well weeded one; but let that be no excuse for dirtiness. The grasses, and some of the weeds, are rarely altogether dead or dormant, even in the dead of winter, and their roots are ever ready to avail themselves of what is going in the soil. As the nitrates are formed they are made use of; and so with other plant food in the soil. The growth of each season being left to wither, the decayed matter gradually comes to be assimilated to the mould that gathers in the network of rootlets beneath such herbage, and which constitutes the great agricultural virtue of old sward—so full of matter that insures enormous crops of corn. And thus the natural process of enriching the surface soil at the expense of the subsoil and the atmosphere may go on indefinitely so long as the trees remain unfelled, and the annual growth of herbage is not removed, but allowed to die and decay where it grew.

R. H.

THE ENGLISH ARBORICULTURAL SOCIETY.—The second annual meeting of the members of this society was held in the Town Hall, Hexham, on Saturday, Nov. 24th, Mr. C. J. Bates, of Heddon and Langley Castle, in the chair. New members were approved, and resolutions passed urging greater effort in the creation of a deeper interest in forestry among landowners and others. At the close of the business part of the meeting an interesting paper on 'The Experimental Planting of Trees not generally Known, or as yet not Fairly Tested, in the North of England,' was read by Mr. J. N. Robson, Nurseryman, Hexham.

THE FOREST QUESTION IN RUSSIA.

THE problem of checking the hitherto practically unhindered destruction of what, in a very true sense, may be called the national forests of Russia, is at length in a fair way of receiving definite solution at the hands of the Government. In some other countries of Europe the cry of 'Woodman, spare that tree,' is little more than a mere appeal to bucolic sentiment; in Russia it is the expression of a grave economical anxiety—of a sense of the peril threatened to interests of really vast importance for the future development of the Empire. Nor is legislation on the subject at all new. Peter the Great was the first to recognise by enactment the prospective value of the arboreal treasures of his realm, and succeeding Emperors have nearly all of them done something in 'improvement' of the forest laws; yet, somehow or other, the tree-feller has for decades past been wandering about at his own sweet will. That his previous activity represents a certain amount of industrial necessity as its exciting cause must be admitted. Russia sends her forests abroad to the extent of exports of wood reaching the value of over thirty millions of roubles annually. Then there is the vastly more important home consumption to be taken into account. Lack of stone throws the country almost wholly upon wood for its building materials; and how often these have to be renewed is tolerably well shown by the saying that Russia is burnt down every seven years. Nor is the Empire much better furnished with coal mines than with quarries. The pits worked in Poland, in Central Russia, and in the region of the Donetz, hardly supply for the purposes of national industry the three-hundredth part of the yield of the mines of Great Britain, while St. Petersburg still has to go on drawing its coal supplies from England. Russia is thus practically dependent for the carrying on of most of her industrial operations upon her forests. Factory and workshop development in recent years has caused the conversion of wood into fuel to attain proportions never before reached. It is calculated that the beet-root factories have alone consumed 10,000 dessiatines of forests. The railway locomotive is another great devourer, and even the steamboat only spares the forest when it plies in the vicinity of the naphtha springs. What the domestic stove (*pech*) turns into smoke and flame every year is a quantity almost too vast to be calculated. Yet all these sources of drain may fairly be called legitimate. M. Reclus thinks Russia has a greater wealth in coal than any other country in Europe; but while the combustible treasures remain hidden the cheaper firing material cannot be given up. At the same time forests have been destroyed unnecessarily. The changed conditions wrought by the emancipation of the serfs have gradually led many of the landed proprietors to dispose of their arboreal rights, with the result that vast forests have been converted into firewood, the consequent lowering of market prices taking place in order to enable the purchasers—not to satisfy a demand, but to realise at almost any cost as speedily as possible. This readiness to put wood into the market has createda sort of Fools' Paradise for the wood consumers of to-day, and left the task of paying the piper to the consumers of the future.

Nor is the question of purely prospective importance. If, on the one hand, the wasteful woodcutter has been raising the prices of the future, on the other hand, he has been doing the most serious injury to those climatic conditions upon which agriculture and commerce so much depend in a country like Russia. Cut down trees, and you at once expose the bared land to the drying action of the wind; water and snow, instead of being left to moisten the ground, evaporate with almost phenomenal rapidity. A Russian proverb—'When man comes, water goes'—shows that the process is not exclusively modern. The disappearance of watercourses in Russia has been going on for centuries. Lakes have evaporated to the last drop. In many parts wells have gradually disappeared, and for want of water numerous gardens and orchards have had to be abandoned. The sand steppes are supposed to be gradually disappearing, yet this is only true in a very limited sense, if true at all; the surest way of reducing the agricultural value of any given territory being the destruction of whatever trees it may happen to possess. Then there is the loss to the rivers. Cut down trees, and you infallibly devote to evaporation a part of the supply of the nearest watercourse. The river Tiligul is an illustration. In 1825 it was represented on Russian military maps as being united to the sea by a broad mouth, and now at this very spot there is an isthmus over which goes the post-road from Nikolaef to Odessa. Formerly the Tiligul drove fifteen mills, big and little; to-day not one of them remains, the flow of the river having become practically *nil.* The Volga also is beginning to give cause for serious apprehension. In the spring it still runs broad and full after the melting of the ice, but in the autumn its waters are beginning to lack sufficient depth in parts for free navigation. Whether this is due, to some extent, to the multiplication of sand-banks or changes in their levels is a question of not much importance here; the effect is the same and is clearly, if not wholly, traceable to the practice of cutting down trees, not wisely but too well. Forests often protect rivers, and even villages, from the encroachments of sand; as a means of lessening or preventing drought their agricultural importance is high. Yet Russia has gone on intensifying her climatic disadvantages, doing injury to her crops, and emptying her watercourses, simply because she has not had the presence of mind and the forethought to formulate a ukase on the subject.

But the end of all this bad husbandry seems now near. The question has been considered by the Imperial Council, and the resulting decisions will in all probability take the form in which they have been drawn up by M. Ostrovsky. The Government proposals not only aim at preventing forests from being cut down unnecessarily, but also include a scheme for the encouragement of arboriculture on a large scale. Forests are divided into two categories, a distinction being made between those which have special functions of usefulness, and those which are worth preserving on general grounds of economical benefit to the country at large. On the one hand, protection will be given to forests—indeed, to any kinds of vegetation—which hinder the spread of shifting sands from the banks of the sea or of navigable rivers to towns, settlements, or roads: on the other, to forests, the removal of which would be likely to lead to the destruction of the banks of watercourses. In these cases effect will be given to the law by the zemstvos, or district assemblies. The supervision of private forests will be exercised by the Minister of Domains and Ways, through his officials; a general power being given to the local district authorities to interfere where State interests seem threatened by the action of individuals. The problem of promoting arboriculture is somewhat different. For any effective change in climatic conditions it is calculated that at least eight per cent. of a given territory should consist of forest. In the South of Russia, in the region of the Steppes, scarcely more than half this percentage is found in an area of above ninety dessiatines. To give this part of the country, therefore, the climatic advantages of the centre and northern governments would involve the creation of some hundred thousands of dessiatines of forest land, and, as tree planting costs about 75 roubles per dessiatine, the work, if done thoroughly, would involve an expenditure of something like two millions of roubles. The Government have really no intention to do anything so Quixotic. There will be no attempt to make trees spring up from the salt marshes, or village communes start into being where there is now nothing but shifting sand. Money will be spent liberally, but not lavishly, where there is a fair prospect of retaining valuable land by means of judicious arboriculture. When finances permit some purely experimental tree planting may be indulged in, but only in the agricultural territories. Pressure will also be brought to bear upon landed proprietors to make them comply with already existing laws.

The enactments on the subject require that owners of forest lands shall replant a certain proportion of their property every ten years ; but, owing to the laxity of the Government and the carelessness or corruption of the forest officials, this regulation has been allowed to become almost a dead letter. New vitality will now be imparted to it, and, provided only that there be no relapse into beaurocratic apathy, the Government may succeed in postponing for at least some centuries longer the coming of that time when, as a Russian writer gravely predicts, the Empire of the Czar will be turned into a howling wilderness ; when a camel-post will run from Merv to Moscow ; and the Turcoman, the New Zealander of Russia, will raise his fortress of mud over the ruins of the Kremlin.—*Russian Correspondent of The Globe.*

PRESENTATION.—Mr. James Gordon, of Rossdhu, who has been forester on the Luss Estates for about nine years past, was recently presented with a handsome timepiece, a gold Albert, and a purse of sovereigns, by the Luss Literary Association, on the occasion of his leaving the district for Edinburgh. Mr. Gordon, in the course of his reply to an address at the time of the presentation, said :—He did not require to receive these substantial gifts to be assured of their respect for him. In reference to his leaving Luss, he would say a few words on the subject especially as erroneous causes had been assigned for that step. In the outset the cause was not to be found in any lack of indulgent kindness shown him by his employers. To a forester in love with his profession those estates must ever stand high in his esteem. Speaking of the soil, of its aspect, and of its exposure, he need not state that a large portion of these estates was admirably adapted to grow timber. Truly, Luss was not without its attractions for him and all his family. But, as with servants of the State, so with servants of estates : times come unsought for when change is not only desirable but also necessary ; and he therefore resolved upon dissolving his connection with these estates, and the Trustees very kindly accepted his resignation. The reason might not satisfy them, but it had satisfied one who was perhaps as exacting in the matter of reasons as any among them—he meant himself. In reference to their Association he had always to guard against undue fervour when speaking of this society, and the present occasion would not justify him in giving uncurbed expression to his feelings. But he would tell them that never were the society's prospects better than they were now. The syllabus for this session was an excellent one. They had recently got a large addition to the library. Old members stood true to them, and new ones were taking their stand beside them. When men place themselves on the side of good, all good men are on their side, and while acting the part of secretary during past years he had had many striking illustrations of the fact they stated. When they deserved success they had succeeded. Some time ago the services of a professor of elocution were obtained for the members. What hinders that professors of geology and botany were not got likewise, so that workers in stone might be taught a scientific knowledge of stones, and that growers of plants and hewers of wood might come to know something of the wonderful structure of the things they handle ? To be educated, in the strict sense of the word, was what few can aspire to be ; but to be well instructed in the matters with which they daily come into contact, is what every member of this society should regard as possible. He asked them, in conclusion, to accept his thanks for those gifts, for their coming there that night, and thanks for their attentive audience.

CHESTNUTS.

HAPPENING to turn to the 'Journal of Forestry' for February, 1882, p. 703, I noticed that a correspondent ('H. E.') does not do justice to the merits of the Sweet or Spanish Chestnut as a timber tree.

It is true that the tree when old and large often grows with a twist, and, it is said, is apt to be shaky in the interior. But it will certainly grow tall and straight up to a diameter of 2 to 3 ft. or more, and this upon very poor soil, such as that of the Hastings Sands, the strata which form the lower division of the Wealden formation, and which run through Sussex and Kent.

Every one knows that the Chestnut grows much faster than the Oak, but so much depends on soil and situation that it would be difficult to state the comparative growth with precision. I apprehend, however, that the Chestnut grows at least twice as fast as the Oak; I find that a Chestnut has in nine years attained a girth of 14 in. at four feet from the ground; but this is from an old stool. I find that the rings of annual growth of a Chestnut between 30 and 40 years old average $\frac{2}{11}$ of an inch each, and in a specimen of Chestnut wood which formed part of some carved work executed at Avignon before 1550, that the rings measure just the same, 5½ measuring an inch.

But the wood not only is quickly produced, but is of excellent quality. I have just tried the strength of it in comparison with that of Oak, and I find that a rod of Chestnut half an inch square, supported on points 14 in. apart, required a weight of 49½ lbs. to break it, while a like rod of Oak, of fair quality, of (I believe) English growth, broke with a weight of 46 lbs., and one of ordinary wainscot Oak with a weight of 35 lbs.

It is a wood extremely well adapted for decorative carving, for it has great smoothness and fineness of texture; in these respects it is much superior to Oak, and when old it acquires a fine, rich brown colour decidedly preferable to the somewhat dull brown of old Oak.

Whether it would be as durable as Oak under all circumstances, I do not know, but I observe in the carving mentioned above, now more than 300 years old, the heart wood is in the soundest condition and quite untouched by worms; the sapwood, on the contrary, of which some portions of the panels of carving were formed, was much decayed and worm-eaten.

Mr. Hunter, in his notes on Evelyn's 'Sylva,' says that parts of Chestnuts are more durable than those of Oak; and if parts, why not other things?

The bark is, I believe, not very far inferior to that of Oak for tanning.

Chestnut timber, no doubt, bears a lower price in the market than Oak, but this I apprehend is in some degree due to its comparative rarity having led in a great degree to its disuse, and consequently to a want of demand. But even at its present low price it is evident that it would be much more profitable to grow it on poor soils than to grow Oak. I have here (Oldlands, Uckfield) Chestnut trees which I have reason to believe to be less than 40 years old, one of which measures 2 ft. in diameter at three feet from the ground, and runs at least 30 ft. without branching. I do not believe that an Oak would, on the same soil, have attained like dimensions in twice as many years.

I have used Chestnut wood grown here in some rather difficult carving with much satisfaction, for while it cuts very freely and smoothly, it is very strong and tenacious, and can be undercut in the boldest manner.

Every one recognises the beauty of the tree, but I may add that the leaf when dying takes a very fine, rich yellow, which in Autumn, contrasts most beautifully with the colours assumed by the Oak and the Beech.

I enclose a fragment of the ancient carving which I have mentioned, which will show how fine the colour of old Chestnut becomes.

The wood has another important advantage over Oak, viz., that it does not warp.

ALEXANDER NESBITT.

Oldlands, Uckfield.

TREES AT LONG ISLAND.—There are some remarkable trees now growing on Long Island, according to the *Flushing Times:*— A White Mulberry-tree on a farm at Mattituck is twelve feet in circumference at the butt. Two large trees near Southold are more than one hundred and fifty years old and each is as large near the ground as a barrel. In Aquebogue stands a Black Walnut-tree twelve feet in circumference and one hundred across the top. It still bears fruit. A Weeping-willow on premises in Riverhead is now more than a century old, and is thirteen feet in circumference near the ground. A Walnut on the farm of the late William Cullen Bryant is twenty-five feet in circumference one-and-a-half feet from the ground, and one hundred and fifty across the top. It bears abundantly. Islip boasts a Pear-tree of whose fruit the oldest resident of the town, who is now eighty years of age, ate when he was a boy. He says it was then a large fruit-bearing tree. Last season it yielded its full complements of fruit. There is a Weeping-beech in the old parson's nursery at Flushing, which is forty feet high and about the same distance across the top. The limbs droop to the earth all around, but leave several openings resembling Gothic doors through which one may pass to the interior.

THE FORESTS OF SWITZERLAND.

SPECIAL attention has been drawn to this subject by the group devoted to the representation of Forestry in the Swiss National Exhibition held recently at Zurich. The promoters of this enterprise have collected much interesting material in the shape of maps and plans, as well as specimens of the various trees and plants grown in the forests of Switzerland. An official report drawn up by Professor Landolt of Zurich is also full of valuable information on the subject.

Out of the entire superficial area of Switzerland (15,714 square miles), the wooded portion represents $17\frac{3}{5}$ per cent. About two-thirds of this part belong to the cantons and various local bodies, while one-third is in the hands of private owners. Both these main divisions have certain features in common, such as the subdivision into small portions. Forests of wide extent do not, as a rule, exist, the reason being that all places suited to agriculture or pasturage have long been cleared. The yield of these forests in wood and other products (including the cost of obtaining them and the transport) represents an annual value of about £1,600,000 sterling. This does not by any means cover the total requirements of the country, and there is annually received from other countries about $1\frac{1}{2}$ millions sterling worth of wood.

The intervention of the State in the regulation of forests seems to have been prompted in the first instance by fears as to an insufficient supply of wood — the earliest record of this action on the part of the Swiss Government dating as far back as the seventeenth century. The measures then adopted were based upon the limitation of exports, and upon the restricted use of wood in the country itself. In the earlier part of the eighteenth century, the development of cultivation seems to have been seriously attempted, the planting of Willows and Poplars on marshy land having then been enjoined. About the year 1760 several disinterested men gave their serious attention to forest matters, and strove to effect certain needed improvements, drawing up proposals on the subject in a detailed form. Acting on these counsels, the authorities did not merely content themselves with renewing previous injunctions as to economy in the use of wood, but established a better system of cultivation than had hitherto been in force, appointing in some cantons special officials to see to the carrying out of the forest regulations then introduced.

These measures were successful; but the years of war which followed witnessed no further activity in this direction. At a subsequent period, legislation again dealt with the subject, but real progress was very slow. In the years between 1830 and 1840 the opinion became generally accepted that forests were not only intended to furnish supplies of wood, but have also other objects in the economy of Nature, upon which the welfare of the people is in a great measure dependent. This view was of material assistance in the economy of forestry. All the cantonal governments devoted attention to enacting forest laws, and to seeing they were observed. Though in some cases these endeavours were not successful, a good deal of improvement was made in level and hilly districts; the higher mountainous regions not making equal progress in the matter. The federal authorities, moreover, gave attention to the subject, the practical importance of which was recognised by the establishment, in 1855, of a School of Forestry. An official investigation as to the situation of mountain forests took place in 1858, and money was spent later on in executing various improvements.

A federal law of 24th March, 1876, provided for supervision by the government of forest matters in the mountainous districts, thus affording a definite foundation for the national organisation dealing with the subject. The principal object of forest officials is now the carrying out of such improvements as experience has shown to be necessary; and the Exhibition is considered likely to be of service in this respect, by displaying what has been done, and by giving prominence to the various means by which the ends in view may be most easily attained.

Maps and works bearing on forestry are shown by the Department of the Ministry of Agriculture which deals with that particular subject, as well as by the School of Forestry in connection with the Polytechnic Institution at Zurich. Various cantonal authorities exhibit specimens of the products of forests under their jurisdiction; and the entire display, though not large, is valuable as illustrating the past and present features of Swiss forestry.

J. W. B.

* * *

SALE OF TIMBER IN DARNAWAY FOREST.

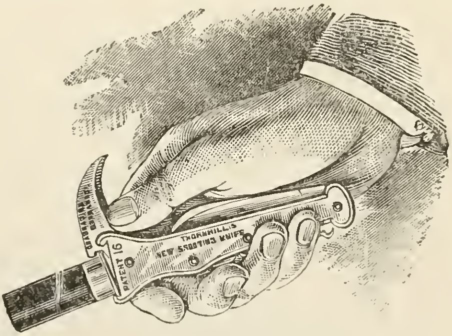
THE annual sale of hardwoods took place at Darnaway on Wednesday, the 13th October. The timber consisted chiefly of Oak; but a considerable quantity of Ash and Elm was also disposed of, which, however, was mainly of secondary or inferior quality, and generally of small dimensions. The greater portion of the Oak was of excellent quality, and much of it was of fairly good dimensions. A brisk demand was experienced, which resulted in a very satisfactory sale. Logs of a pretty good size, and suited for boat-building purposes, realised from 2s. to 2s. 5d. per cubic foot; medium size, from 1s. 6d. to 1s. 10d. per foot; smaller sizes, from 9d. to 1s. 2d. per foot. Ash from 9d. to 1s. 6d. per cubic foot; Elm from 6d. to 1s. 3d. per cubic foot; Oak burnwood, for fish-curing purposes, about 12s. 6d. per ton; Birch for bobbins, 10s. per ton; mixed firewood, from 8s. to 9s. per ton.

Average price of Oak per cubic foot, fully 1s. 10d.
„ of Ash „ „ 1s. 0¼d.
„ of Elm „ . „ 0s. 11d.

The purchasers in all cases being at the expense of removing their purchases. The chief purchasers were—Mr. M'Ewen, Wick; Messrs. Wilson and Son, Menzies and Son, and Bain, Forres; Findlay, Burghead; Leddingham and Main, Hopeman; M'Connachie, Slater, A. and W. Wood, Lossiemouth; and Duncan, Speymouth.

THE SPORTSMAN'S KNIFE.

MESSRS. THORNHILL and Co., of New Bond Street, have sent us a specimen of their 'Sportsman's Knife,' containing a good blade, corkscrew, button-hook, and champagne opener. The knife is just the thing for the shooting-coat pocket. The German silver sides of the knife form two cartridge extractors, and by means of the notch in the back of the champagne opener (as shown in the illustration) it can be made to extract any size cartridge. This alone is sufficient to make it a popular knife with 'gunners.'



A NEW DROPPER FOR CORRIMONY FENCING.

WE have had brought under our notice a very important improvement in the manufacture of Corrimony Fencing. Upon the introduction of this economical style of strained wire fencing by Mr. Thomas Ogilvy in 1873, it rapidly grew in universal favour as eminently suitable for enclosing woods and plantations, and there are at the present time many hundreds of miles in use for this purpose in various parts of the country.

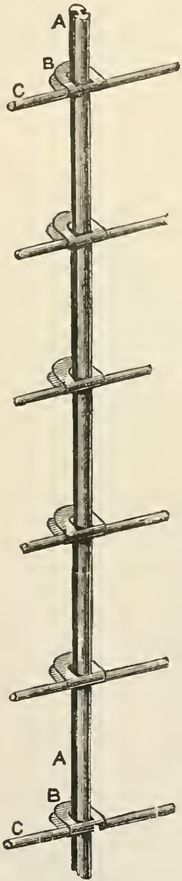


Fig. 4.
A Dropper fixed complete.

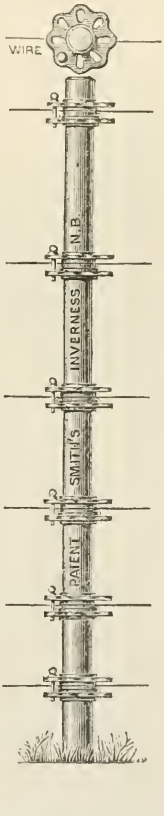


Fig. 5.
A new Intermediate Winding Pillar.

The general features of the Corrimony system of fencing, and the many advantages it possesses over other systems for traversing undulating ground, and the cheap and easy method of fixing it, are now so well known, that it is unnecessary here to enter on a minute and detailed description of the method of its construction, and the variety of purposes to which it has been applied.

To properly secure the droppers, that is, the vertical pillars that are not fixed in the ground, has always been a matter of some difficulty, and since the days of the primitive wooden droppers, many improvements have from time to time been introduced to effect this object. The plan hitherto adopted by manufacturers has been invariably to fix the droppers to the wires by means of wedges. To effectively secure the wedges is a tedious operation occupying considerable time, and from the force of the wind, the attacks of cattle, and other causes, there is always a liability of the wedges working loose, and the cost of keeping the fence in proper repair is an item which must be taken into account.

The patent 'Lockfast' dropper, manufactured by Messrs. William Smith & Son, of Inverness, which we now describe, is a distinct departure from and a vast improvement on any other system in use that we know of.

Being so entirely different from methods hitherto adopted—in every one of which the use of small pins or wedges, to secure the wires at every connection with the dropper, is necessary — this system not only economises the process of manufacture, but secures a direct saving of labour during the process of erection. The 'Lockfast' dropper consists of only two parts, all others have at least three. The gripping force being an application of the eccentric, one of the most powerful forces in mechanics, it can be fixed very readily. On reference to the following sectional diagrams, the process will be easily understood. All that requires to be done is to place a clip (B) on each wire, pass the dropper (A) down through them sideways (as in fig. 1), then simply turn it round all at once, by means of plyers for the purpose, till it locks itself fast in position, as shown in fig. 2. All the wires are thus securely and simultaneously locked fast at one operation. Fig. 4. shows a dropper fixed complete.

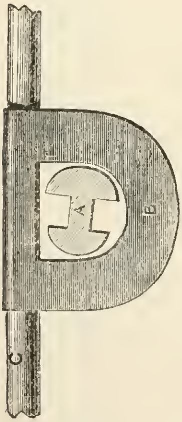


FIG. 1—Shows dropper unfixed.

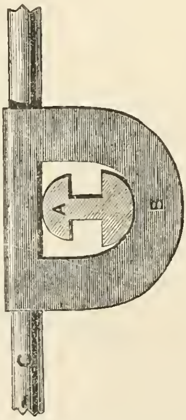


FIG. 2—Shows dropper fixed.

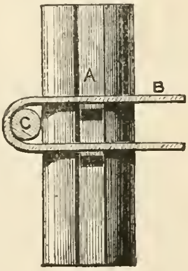


FIG. 3—Side view.

This operation of fixing is extremely simple and speedy, but where the workman has to deal with a dropper requiring wedges it becomes complicated and tedious, as he has then to hammer home as many pegs into each dropper as there are wires in the fence. An unskilled workman can fix as many as 800 'Lockfast' droppers in a day, while a skilled mechanic could not perhaps put up more than 120 droppers of the ordinary type. The success of the 'Lockfast' dropper in this respect has exceeded the expectations of all who have tried it. It is evidently the outcome of a long experience and patient study, for, simple as it appears, it is a very ingenious contrivance.

Fig. 5. is an illustration of an intermediate winding pillar, and a top view of the 'universal' winder. For every position in which a wire winder is needed this one is adaptable, whether for terminal, intermediate, or angle pillars. It is neat and ornamental in appearance, in use powerful and effective, and it is cheap.

The 'Lockfast' dropper system has been already introduced on several large estates, where it gives every satisfaction. It only requires to be better known to secure a large sale; and any of our friends who are now contemplating the erection of fencing for plantations or other purposes, would do well to communicate with the manufacturers.

For Colonial use, where long stretches of fencing are required, for sheep runs, cattle ranches, ostrich farms, and other purposes, this system is, on account of its simplicity, strength, and cheapness, very suitable; also that it can be quickly fixed by unskilled labour, is for such situations a strong recommendation in its favour.

ON THE GROWTH OF PINUS AUSTRIACA.

HAVING for many years looked upon the Austrian Pine as the most certain grower of all the coniferæ, I think it may be useful to state where I have noticed it failing. This has happened in a plantation of eighteen years' growth adjoining woodlands, at an elevation of a thousand feet above the sea. The upper portion of the plantation is naturally dry, having a substratum of sandstone. The remainder is thoroughly drained by open dykes four feet deep. Austrian and Scotch Fir comprise the principal varieties planted. Until three years ago nothing could exceed the vigour of the Austrian. Plenty of room was afforded to each plant to allow of the free growth of the lower branches, so as to increase the root-hold, and avoid top-heaviness so fatal in a storm in an exposed position.

In the spring of 1880, a severe frost with a most cutting wind produced disastrous results—especially on the dry bank referred to—among the Austrian Pines. A fire could not have more utterly blasted some of these, which, up to that time, seemed models of healthy growth. The vitality of the whole was, I believe, to some extent affected, for they have by degrees dwindled away; and the last cruel March frosts, following upon two or three weeks of extremely warm, forcing weather, gave the finishing stroke to the survivors, and they will all have to be cut down.

The Scotch Firs do not appear to have suffered at all, and the contrast is most remarkable, standing as they do side by side. Four years ago every one would have given the preference to the Austrian Pine, as evincing the healthier and sturdier growth.

I may say that a main reason of my frequently recommending the planting of Austrian instead of Scotch Pines is that I have lost faith in the ability of procuring the true Highland Pine from nurserymen. It is tolerably well known that the so-called Scotch seedlings are frequently as foreign as the Austrian in their origin, so that, in the most fitting situations, there is less inducement to adopt them as standard trees. In England another consideration has to be constantly regarded nowadays, which is the widely extended influence of smoke, when selecting any variety of tree as a standard. Of all coniferæ Scotch Pines seem the first affected, and Austrian the last, by this ever-increasing nuisance of unconsumed carbon in the air. I had also given the Austrian Pine credit for being as hardy as any tree of its character, and for this reason planted it at all elevations, and hitherto successfully. I think it therefore important to record the only failure I have met with, and perhaps among the readers of FORESTRY this instance may elicit facts of a similar character which may be of service to planters. W. LIPSCOMB.

KENSINGTON GARDENS.—Perhaps something will now be done to remedy the state of things existing in these gardens, for some time since a correspondent writing to the *Times* gave the following account of their condition :—He said These Gardens present a sad sight just now to those who knew them well a few years ago. The huge boles of the dead trees which are being cut down are lying about in all directions, and the open spaces thus created are exposing to view the lank, rugged forms of the dying trees still standing. It would, perhaps, be dangerous to leave the dead trees standing any longer, but the open spaces which are being made by cutting them down will prove very injurious to those which it is intended to preserve by exposing them to wind storms. Most of the trees in the Gardens have been ruined by neglect of thinning years ago, and consequently have long, weak stems and small roots, which make them easy victims to strong winds. The large open space made by cutting down some trees on the north side of the Gardens two or three years ago exposed some fine trees—especially some fine healthy Beeches—which it was intended to preserve, but which were unfortunately uprooted by the first wind storm which followed the clearing. This, of course, is a danger well known to foresters, and is not ignored by them, especially in old neglected plantations. Many of the trees still standing in the Gardens are half dead already ; the upper portions appear to have been killed—probably by the smoke from the houses which have sprung up to the westward—since they attained their present height, but the lower portions appear to possess a good deal of vigour. Would it not be well to pollard them by cutting freely into the living parts, instead of leaving them to die piecemeal, or cutting them down at once as past recovery? We do not like pollarding trees in England, but here it is the least of two evils, as it is more than probable that the days of tall naturally-shaped trees are over for Kensington Gardens—except, perhaps, for Oriental Planes. The half-dead trees in the Gardens are chiefly Limes and Elms, which bear pollarding well, and Chestnuts, which are less tolerant of it. The lopped trees in Epping Forest and Burnham Beeches are hardly less picturesque than the natural ones, and at the worst pollarded trees are better than no trees, and at the present rate of destruction Kensington Gardens promises soon to be a real 'open space.'

FORESTS IN ALSACE-LORRAINE.

THE systematic treatment of all matters connected with forests which has marked the introduction of German rule in the annexed provinces, has led to the publication from time to time of interesting statistical returns. An examination of these valuable sources of information shows that the area of the provinces is about 5,600 English square miles, of which 63·88 per cent. is devoted to agriculture, while 30·59 per cent. is forest-land. Thus, assuming the population of 1880 (1,566,670) as a basis of calculation, there is about seven-tenths of an acre of forest-land per head. The proportion in Wurtemberg is only slightly higher, while in Saxony it is only half as much. In this way the importance of the district in question as to forest culture and kindred subjects may readily be appreciated.

Of the before-mentioned wooded surface, nearly one-third is owned by the State, a small percentage being the joint property of the State and of local authorities. District administrations and institutions lay claim to 45 per cent., the remaining 21 per cent. being in the hands of private owners. Since the annexation of the provinces in question, the Government property has been increased by purchases to the extent of 1,750 acres, but the laying out of artillery practising grounds in the forest of Hagenau has not only counterbalanced these acquisitions, but has resulted in an ultimate decrease of about 1,250 acres in the area held by the State. The portion under official control (as distinct from private supervision) is therefore about 1,350 square miles, 63 chief foresters being entrusted with the care of this portion of the land. The districts allotted to each are not uniform in extent, varying according to the natural features of the locality; those situated in moderately level situations being the largest. Under these 63 principal officials there are 785 subordinates.

The situation of the forests as regards the age of trees is said to be relatively favourable, it being evident that the French administration exercised a judicious caution as to the use of the wood grown in forests under Government control. The policy of the present owners of the territory is similar in its general tendency, but the results of their efforts are to an appreciable extent neutralised by rights of removal, exercised by third persons. To this cause a direct loss of £11,000 per annum has been attributed, while the indirect prejudice resulting is estimated as representing a much larger sum.

The construction of roads for the transport of wood was in former times carried out according to the pleasure of timber buyers, who would purchase a large quantity of wood while yet standing, having to fell it at their own expense. With a view of maintaining in their integrity the natural defences of the country, every obstacle had been placed by the authorities in the way of regular highways being constructed in the forests of the border districts. Thus the German officials in charge of forests had to devise and execute by degrees a new system of road communications, intended to facilitate the transport of wood. Progress was rapidly made in this direction, no less than 350 miles of new roads having been constructed between 1872 and 1877. Thus the administrative Government of the province did not shrink from the expenditure involved by such measures as were taken in the interest of the future welfare of the annexed districts.

The statistics available as to the annual yield of wood and the profits realised are both lucid and interesting. The average quantity of wood sold per acre in the Government forests is estimated at about 57 cubic feet; that in the forests belonging to district administrations being about 12½ per cent. more. Comparison of these figures with those affecting other localities is difficult, from the fact that the results obtained are influenced by a variety of causes, such as soil, climate, description of wood, age of trees, &c. These influences can seldom be the subject of exact calculations. The movement of prices within the last ten years is illustrated by the fact that the average price of all assortments of wood has varied between 4d. per cubic foot in 1873, and 2⅞d. in 1882. The average gross receipts per acre of wooded surface during that period has been about 17s. 8d., of which 92 per cent. has been produced by the yield of wood; the expenses representing on an average about 48 per cent. of the gross amount received. The results in other parts of Germany have been found more favourable, the yield of wood being higher. It is, however, anticipated upon good authority that an improvement in this respect will take place in Alsace-Lorraine before long.

According to statistics published in connection with the recent German Forestry Congress, it would seem that the *Code forestier* is still practically recognised in Alsace-Lorraine; more particularly with regard to the forests which belong to district authorities. It would seem that the increase of Pines in certain districts has tended to produce in such localities an exhaustion of the productive capacity of the soil. Beech and White Fir each occupy one-third of the entire surface, according to details put forward, while Oak is found in the higher districts in the proportion of 11·6 per cent.

T. W. B.

FORESTRY THE PIONEER OF AGRICULTURE.*

IN an age and at a time when agitators and legislators are so much occupied by questions affecting land and land tenure, and the laws and regulations applied thereto, I think we may be excused from making a few remarks on the question of forestry as necessarily connected with, and practically inseparable from, all legislation bearing upon land. We have had in the Sister Isle a superabundance of agitation connected with land. Indeed, I think the land question may justly be said to contain the alpha and omega of the various measures of concession and coercion which have been passed by our present and former legislators, having special application to the Emerald Isle. I do not intend dealing to-day with the question that I have taken the liberty of bringing before this meeting from a political point of view, neither do I purpose discussing the question of the policy of the present Government as it regards the land question, but I refer to what may be justly cited as the want of a policy in England as it regards forestry, which is of paramount importance to the nation at large. In forwarding the progress of agriculture and its interests, how many laws and regulations have found their way into the statute book, not only as regards Ireland, but having special application to England, yet how many enactments have found a place on the statute book bearing directly upon forestry, how many animated debates and how many eloquent appeals have been made on behalf of forestry? Is the question of less importance than many which excite the attention and demand the consideration of our senators, or is it that foresters as a class are a long-suffering and patient class, and that many of their views, though firmly held and built upon a good sound basis, have not been so fully given expression to, and exploded as they ought to have been. However, I am glad to be able to remind this meeting that the claims of the subject upon our legislators and the mass of mankind are now being pressed home, and that we have two able exponents of the subject in the House of Commons. I refer to Sir John Lubbock, M.P. for London University, and Dr. Lyons, M.P. for Dublin, the former contending for an extension of Forests in England, Scotland, and Wales, and the latter for the re-afforesting of Ireland. How tenable the arguments used, and how sound the positions these gentlemen hold, may be easily understood when we compare the area of land under woods and forests in the United Kingdom as contrasted with the area occupied by timber in other and continental countries; and when we do this we must at once admit the importance of the question at issue. In round numbers, I believe it is admitted that 16 per cent. of the area of France is occupied by woods, 23 per cent. of the area of Prussia, 31 per cent. of Austria, 42½ per cent. of Russia; whereas in great Britain only 4 per cent. of the area is occupied by woods, and only 1¾ per cent. of Ireland. Certainly a striking contrast when compared with the countries we have named. Only 2,500,000 acres of land are under timber in the United Kingdom as shown by the Board of Trade returns this year, about 125,000 acres of which are held by the Crown, the rest by private proprietors. The Crown last season certainly made a small addition to the area it held under forests, but of a very trifling extent, when it is considered how much land is so held that might be judiciously and profitably planted. I do not think it will be necessary to attempt, here, to demonstrate the great advantages that are derived by our agricultural friends from judicious planting. The fact is self-evident to practical foresters, &c., such as I have the pleasure of submitting my views to here. Shelter is afforded as the trees grow and increase in size, and injurious climatic influences are materially affected, modified, and made subservient to man's wants and best interests. This matter is easily demonstrated and illustrated by a careful observation of the hilly and mountainous districts in our own country, where forestry has been studied and encouraged in the past. Now closely following the planting of trees, have we the breaking up of the hitherto waste lands carried out, causing the latent, barren and unfruitful ground to carry a beautiful green carpet of valuable herbage, intersected here and there with forests containing trees possessed of various hues of colour, beautifying the general landscape and enhancing the value of surrounding property. This is the result of a proper practical application of forestry; but how much land is there still to possess? and now that the subject is assuming definite proportions and demanding the attention of our legislators, is it not the duty of foresters, with their practical knowledge of the question at issue, to make themselves felt and heard? I am not here to-day to discuss the merits or demerits of the Irish Land Bill, nor to either commend or condemn this measure in its general application, but I cannot leave the question of legislation as affecting land tenure without pointing out what I consider a serious defect in the Irish Land Bill, as it regards forestry, and that is this. There are many hundreds, nay thousands, of acres of land now used as sheep walks of comparatively little value for the purpose for which they are used, and in many cases let at 2s., and even less than 1s. per acre, which could be planted with great advantage to the proprietor, which would, if planted, materially benefit the tenants occupying land in the immediate neighbourhood, which cannot now be made available for planting unless with the consent of the present occupier, and I think whatever good may have accrued to the Irish tenant farmers from the Land Act of 1881, a reservation ought to have been carried with the enactment, enabling and empowering the proprietor to acquire such land under reasonable notice, when not held by lease. As I take it, this line of policy would have implied the greatest good to the greatest number of people. It is true that a proprietor may still buy up the interest of the occupier and plant, but it is quite possible, and exceedingly probable, that in many cases the tenant would set such a value on his interest that the proprietor would not feel justified in meeting his demands for planting purposes. There is still another way open by which such land is available for planting purposes, and which has been very succinctly referred to by Dr. Lyons, viz., planting under a joint interest by proprietor and tenant ; such an arrangement presupposes an amicable feeling and relationship as existing between proprietor and tenant, a condition that we all admit is very necessary to encourage and foster, especially in Ireland. Probably some gentleman here may say we are not interested in the Irish Land question as it affects forestry in the Emerald Isle, or the re-afforesting of Ireland ; but I beg to submit that we are deeply interested in the question, simply because unfavourable seasons, deficient yield of crops, and low prices ruling for agricultural produce, caused discontent, and discontent in its turn begat agitation, culminating in the passing of the Irish Land Bill in 1881, with its conditions, revolutionising the conditions of land tenure Unfavourable seasons and low prices ruling with a moderate development of the same element caused an English Land Bill to pass through the hands of our legislators during the past session, and become law, not so far-reaching as the Irish Land Bill, but to a considerable extent built on the same foundation. Meanwhile our landed proprietors are at liberty to take up lands by notice when not held under lease, and plant should they wish so to do ; but who knows how far legislation will reach the next time this question comes up for consideration ? and we shall do well to note the general drift o legislation ere it is too late. Fortunately the question of forestry and of re-afforesting, is so far practically a non-political question i the House of Commons, and I trust it will remain so. I do think this, that our landed proprietors, agents, foresters, and nurserymen interested in this great question ought to make themselves and their views more felt and understood by those who frame our laws. I consider and am sure you must admit that Dr. Lyons in two short years has done much to elucidate the question of forestry in the House of Commons and has obtained from the Government one very important concession, viz., the facility now offered and power granted to Irish landed proprietors to borrow money from Government to carry out planting operations under a clause inserted in the Irish Tramways Bill, which passed during the past session. This is an important step in the right direction, and if such facilities are offered to Ireland, why should not the same favours be extended to England and Scotland, where proprietors have shown a keener interest in carrying out planting operations. There is another view of this subject, which I think I may be pardoned for introducing here, and that is the benefits and comforts derived directly by the general public from forestry. I maintain that forestry is not only the pioneer of agriculture, but certainly an important factor, as it regards its effects on the masses of the world's population, comprehending and containing its various bearings, developments, aspects, and effects, a world-wide area and importance. We reason under this head that if we had more judicious planting we should, as a result, have more grain produced in Britain, and as a result require to import less. We should have more valuable herbage, and hence could produce more cattle and sheep, and thereby materially assist in finding food for the million. All-important as this application of forestry is, it has a still more direct application to the well-being of our people. I am not here to-day as an historian to say in what form this small ball called Earth left the hands of the great Architect of the Universe, nor can I tell how long old Father Chaos reigned therein, but I read of a time when he was dethroned, and order reigned supreme. I read of a beautiful world prepared for man's reception, and in the great work of creation I follow a marvellous fitness and adaptability in all things, and one of the most wonderful developments and illustrations of that fitness I take it was the creation of trees bearing seed, reproducing their own species and developing variety. What I wish to evolve here is the fact that trees were created with powers of reproduction fitted to meet man's wants; they are absolutely necessary and indispensable in meeting man's requirements and necessities. Need I remind you how largely trees, converted into timber, have entered into many of the greatest events in the world's history? I shall not attempt to cite instances—they are too numerous. Whilst discountenancing wars, and owning that war, with all the glory that can be ascribed to it, is an unqualified evil; whilst we admit this, we must still be prepared to own that the old wooden walls were the means employed, to a great extent, in making and keeping England what she is to-day—the greatest naval power in the world; and although timber does not occupy such an important position in the construction of our naval fleet as it was wont to do, simply because the genius of Sir Wm. Armstrong and his coadjutors produced engines of destruction before which the wood walls could not stand; still, how largely is timber yet made available in combination with iron in the structure of our floating towns, and both mercantile and naval, boats of which we, as Englishmen, are proud. But important as this view of the adaptability of trees to our wants is, we are brought still more closely to consider the adaptability of trees to the everyday wants of man. How would we succeed in the building of our cities, towns, and houses without timber? how could railway enterprise have made the rapid strides it has, and could it have succeeded, as it has done, without the assistance and practical adaptability of timber? a work and enterprise of which every Northumbrian has a right to be proud, because the county produced that man of illustrious memory George Stephenson, the pioneer of this great railway revolution. I am aware that much could have been done in these great works without the use of timber, but at a great disadvantage, and in most cases at a maximum of cost, with the result of a minimum of comfort. Man begins life with an adaptability of timber to his wants, and it goes with him through life, and provides a wooden house for his dust in the grave.

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* A Paper read at a meeting of the members of the English Arboricultural Society by Mr. W. Fell, of the firm of Messrs. W, Fell and Co., Nurserymen, Wentworth Nurseries, Hexham.

Having briefly noticed the importance of trees generally without in any way attempting to discriminate and demonstrate the greater value of one timber over another, as adapted to the several wants of man, it might be judicious ere leaving this part of the subject to remember the variety of trees there are, their several qualities fitting them for our several necessities. Now, with such views and self-evident facts before us, does the question not naturally obtrude itself upon us, Whence comes all this timber consumed in England? Where do the trees grow that produce such vast quantities of timber? I need not for one moment attempt to demonstrate to intellectual persons that we are largely indebted to the Continent and other timber-producing districts of the globe for our supplies. Does the question not naturally suggest itself—Are these supplies inexhaustible? The Canadians, the Americans, the Indian Government, and some of the continental nations have been and are awaking to the unpleasant knowledge that, what appeared in times past, especially in Canada, the United States, Norway, and Sweden, as an illimitable stock, is steadily decreasing, and that we are within a measurable distance of the time when the want of timber will be seriously felt. Able statisticians have carefully computed the stock available in the States and Canada, and place the time when the want of timber will be felt at the short distance of from 10 to 20 years. The supposed unlimited supplies in Norway and Sweden are also showing evident signs of diminution. In these countries, where timber far exceeded the immediate wants of man for so many years in the past, it has in too many cases been ruthlessly destroyed to make room for the new settler. There is no doubt that the growth of timber on the earth's surface at one period far exceeded man's wants. There was more than enough to meet his requirements. So far as I can learn, there never was a time in the world's history in which there were such strong indications as at present that we are rapidly approaching a time when this want will be generally felt, and as such must be provided for. Some people may say that the present prices of timber do not indicate the likelihood of any approaching dearth of timber, which I admit at once; but it is easily accounted for by the fact that greater facilities are yearly obtained for bringing timber from the interior of timber producing countries to the seaboard for shipment. The lumberman goes on felling trees and selling at such prices as he can realise, and so long as there are trees available on which he can ply his axe this state of things will to a considerable extent prevail, until we some day learn that the stock of growing timber in these countries is practically exhausted. Having endeavoured to demonstrate what an important element forestry is now, and that it must be infinitely more so in the future in affecting the necessities and comforts of man, does it not behove us to see well to it that our foresters shall not be superseded by foresters of other nationalities. I think this a very necessary consideration, especially so as even now some of the best and most remunerative colonial appointments are not held by Englishmen, nor by Scotchmen, but by Frenchmen, which is attributable, I fear, to the fact that sufficient attention is not, nor has not, been paid to the education of our foresters in forestry. If forestry is so important a branch of industry, and so much depends upon it as I have but indifferently set forth, ought not every facility to be given and made available for the general development of a thoroughly practical and technical knowledge of this science, which, I think, would be promoted and fostered by schools of forestry, prize essays, and the like, bearing directly on the question? I do not for a moment wish it to be supposed that I imply that our foresters are not an able, practical class of men; quite the contrary. I believe them to be most practical, and to have a very good general knowledge of their profession. What I complain of is that so little general knowledge of forestry is attempted to be diffused by our various systems and educational schemes, and this is what I wish to see remedied. Why should forestry not be recognised as important a branch of our general system of education as the many other sciences that are introduced into it. The theoretical knowledge of how to measure a tree is about all that a young man, under present circumstances, leaving school or college, knows of forestry. In short, I maintain that forestry will soon become one of our most important branches of science and industry, and as such I wish to enforce the necessity of extended facilities for the general attainment of a fuller knowledge of its several applications. The exhibition of forestry to be held in Edinburgh next season is certainly an indication of a desire for the further development of knowledge in this particular, and I am very pleased to learn that our beloved Queen (long may she live) has consented to be a patron of that exhibition. With a Prime Minister wielding the axe as the practical forester, her most gracious Majesty patronising an exhibition to forward the interests of forestry, and two eminent Members of Parliament using every endeavour in the House of Commons and out of it to indefinitely extend the field of operations, I think we ought to take encouragement and see that we lose no opportunity of developing and furthering the general interest and bearing of forestry, and in doing so we shall add to the material resources and wealth of our beloved country, and confer a lasting and permanent good upon our fellow-men at large.

TREE MYTHS.

THE ancients (De Gubernatis tells us*), called the Elm the 'Tree of Dreams,' *Ulmus somniorum.* Virgil says :—

'In medio ramos annosaque brachia pandit
Ulmus opaca, nigens, quam sedem somnium vulgo
Vana tenere ferunt, foliisque sub omnibus Nærent.'

It was probably with a recollection of these lines that Petrarch, in an unedited sonnet, associates the Elm with the abode of sleep :—

'Un olmo v'e che'n fronde sogni piove
Da ciascun canto, e che confusamente
Di vero e di menzogna altrui ricopre.'†

A recent French satirist has adopted the same idea of the dream-producing powers of the tree :—

'Aujourd'hui,
Celui qui sommellait sous l'orme
En revant les plus beaux rêves . . .'
Chant de Depart de Gambetta.

Like the Oak, the Elm is thus in some sort a prophetic tree. Pliny employs it to symbolize the prosperity and majesty of the Roman people :—

'Factum hoc populi romani Quiritibus ostentum Cimbricis bellisnuceriæ in loco Junonis, ulmo, postquam cacumen amputatum erat, quoniam in aram ipsam procumbebat, restituta sponte ita ut protinus floreret ; a quo deinde tempor majestas populi romani resurrexit, quæ ante vastata cladibus fuerat.'—xvi. 57.

The ancients also regarded the Elm as a funereal tree, it is said, because it bears no fruit; but De Gubernatis supposes because of its longevity and the ease with which it multiplies.

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* *La Mythologie des Plantes*, vol. 2, 1882.

† First published by Domenico Carbone, at Turin, in 1874.

In Catullus, the Elm is husband and the Vine the wife. So, too, the Sanscrit Kâlidasa makes the Mango the husband of a climbing plant, a species of Jasmine. When the charming Sakuntala comes into the presence of the young King Dushyanti, one of the female courtiers murmurs in the King's ear: 'This *navamallika* (Jasmine) that you call the light of the forest is married of her own free will to *sahakara* (the Mango).'

In the 'Iliad,' Achilles bridges the enchanted streams Xanthus and Simois with the trunks of an Elm tree. When Achilles kills the father of Andromache, he raised in his honour a tomb around which the nymphs came to plant Elms. At the first notes of Orpheus's lyre, bewailing the loss of Eurydice, there sprang up, we are told, a forest of Elms. In Sicily the Fig trees are often trimmed with Elm sprays with the idea of thus preventing the early figs from dropping off before they are ripe.

The Juniper (De Gubernatis says*) is much venerated in Italy, in Germany, and on the shores of the Baltic, by reason of its alleged power to dispel evil influences. In Esthonias, holes and crevices in the walls of dwellings are beaten with a branch of Juniper, lest evil spirits bring sickness there. When the wicked spirits draw nigh and see the Juniper, they take themselves off. At Pistoja, the explanation given of a local custom of hanging a branch of Juniper over every door is that whenever witches see the Juniper they are impelled by an uncontrollable desire to count the leaflets; but these are so numerous that they never can make the number right, and in despair take flight lest they be surprised and detected. There is an analogous belief in Germany. In Waldeck, according to Dr. Maunhardt, when a child falls sick, it is customary for the parents to put a lock of wool and a piece of bread in a bunch of Juniper, that the evil spirits may find employment in eating and spinning therein, and so forget the child, with whom, it is feared, they have been over-busy:

'Ihr Hollen und Hollinen,
Hier bring ich euch was zu spinnen,
Und was zu essen;
Ihr sollt spinnen und essen,
Und meines Kindes vergessen.'

Ye fiends and ministers of hell,
Here bring I wherewithal that ye may spin,
And eat likewise;
Eat, therefore, and spin,
And forget my child.

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* *La Mythologie des Plantes*, vol, 2.

In Germany a 'Frau Wachholder' (Dame Juniper) personifies the genius of the Juniper tree, and is invoked to make robbers give up their spoil. A branch of a Juniper bush is bent down to the ground and kept down with a stone, the name of the real or supposed thief being repeated at the same time, with injunctions to bring back the booty. Whenever the desired result comes about, the stone is removed and the branch set free. Here seems to be a counterpart of the thief-catching staff or rod of Indian folk-lore, which survives in many Aryan usages and customs. Like other trees with hispid foliage, the Juniper has the special attribute of detaining fugitives; but sometimes it shields them as well. An Italian legend described the Madonna as saved in her flight by a Juniper bush, just as in German story the holy Walpurga is hidden from her pursuers by a peasant in a patch of wheat. An aged crone of Signa, in Tuscany, thus related the legend of the Madonna to De Gubernatis:—Our Lady was flying with the infant Jesus, and Herod's soldiers were in hot pursuit. As they went, the Broom trees and the Chick-peas rustled, risking betrayal; the Flax stood bolt upright and apart; but as the fugitives drew near, a Juniper bush parted its branches to receive them, and closing, folded them in its friendly embrace. Wherefore the Virgin then and there cursed both the Broom and the Chick-pea, which from that day forth have never ceased to rustle. The frailty of the Flax she forgave; but she laid her blessing on the Juniper: and to this day, at Christmastide, in nearly every Italian stall, Juniper is hung, as bunches of holly are in England, France, and Switzerland.

Like the Holly, Juniper drives away evil influences of every kind from house and fold, and is held to be peculiarly efficacious in protecting horses and cattle from the incorporeal monsters which sometimes haunt and trouble them.

In Germany, when it is desired to get horses into condition and render them more tractable, a rural custom prevails of giving to each on three Sunday mornings running, before the rising of the sun, three handfuls of salt and six times twelve berries of the Juniper.

In a very rare little work published at Bologna in 1621, the author, Amadeo Castra, makes mention of a Bolognese custom on Christmas Eve of distributing branches of Juniper to every house. He adds that all writers are agreed as to its efficacy against serpents and venomous beasts; that it supplied the wood of the Cross; that it covered the flight of Elias; finally arriving at the conclusion that the sanctity of the Juniper equals that of the Cedar; that its usage is not a fashion or superstition, but a holy mystery; and that as its fragrant smoke arises from our hearths we should remember that so should our prayers ascend to the ears of the Deity.

In Tuscany, branches of Juniper are carried to the churches to be blessed on Palm Sunday. Berghaus tells us that among the Bashkirs Juniper berries are kept as a charm against evil spirits. Porta, in *Phytognomica*, recommends the use of Juniper ashes in leprosy. Pliny tells us that the Greeks and Romans sometimes burned Juniper in place of incense and Rosemary. In Venetia they burn Juniper branches to purify the air for the silkworms; in which, as in the Esthonian custom referred to at the beginning of this paper, we have, possibly, some vague glimmerings of hygienic fact still but imperfectly apprehended by ourselves. H. M. C.

NOTES ON TREES.

THE OAK.—The largest Oak for its age that I ever measured was planted by Lord Mansfield at Scone, on the rich alluvial soil on the banks of the Tay. It stands in the pleasure grounds, and at 68 years old, in 1877, measured 70 ft. in height, and 7 ft. 11 inches in girth, at 5 ft. from the ground. The bole was magnificent, tapering very gradually. At 31 ft. from the ground it measured 6 ft. 4 in. and at 36 ft. the girth reached 5 ft. Its cubical contents were 120 ft.—worth, at 2s. 6d. per foot, £15. This is the largest young Oak of 68 years old that I have ever seen. In about six more generations, or we will say, 200 years, the Scone Oak, will probably have packed beneath its bark about as much timber as any tree of the kind in Great Britain.

Arthur Young obtained some interesting statistics on the growth of Oaks in Sussex, which I will quote from his 'Annals,' for the, sake of comparison. He prepared them with a view to encourage planting for profit; I may quote them as examples of the tons or cubic feet of timber which the planter can produce within a given period.

The red clay of Petworth was noted for its yield of Oak timber. Arthur Young mentions that Lord Egremont cut £5,000 worth of Oak from 9 acres of land, the trees were conjectured to be from 150 to 200 years growth—200 trees sold at £15 a tree; 11, each containing a load of timber, stood in 30 ft. square, or 900 square feet of ground. One tree sold at £70 and was re-sold for £100. Oaks planted at Itchingfield in 1711, cut in 1787, had produced above 30 ft. of timber on an average; one tree produced a load. The timber was worth, at that time, from 10d. to 3s. per foot, according to size and quality.

There was an oak at Petworth, in the park, which contained between seven and eight loads of timber, measuring 14 ft. 3¾ in. in circumference at 5 ft. from the ground, and 22 ft. in height to the first fork. Other reporters, following in Arthur Young's footsteps, have admired the timber of Petworth; and one of them, a writer in the *Gardener's Chronicle*, October 19, 1878, told the story of the Cecil Oak, standing in the park there, near the kennel.

The difference between *maxima* and average results is always very great. In the above examples, a single tree attained 120 cubic feet of timber at 68 years old, and the Itchingfield Oaks attained an average of 30 cubic feet at 76 years old.

The Oaks in Mr. Selby's plantations, *vide British Forest Trees*, reached at 28 years growth, 2 ft. 4 in. girth, in many cases, at 18 in. from the ground, and 3 ft. girth in some instances. The Oak, once, fairly established in favourable soils and situations, increases, according to Selby, from 1 in. to 1¾ in. in circumference, annually, for nearly the first century of its growth, and frequently contains a ton of timber at 70 years old. The Scone Oak has not reached quite 1½ in. of annual growth, so that Mr. Selby's *maximum* exceeds mine so far as mere girth is concerned, but the Scone tree will still be hard to beat in point of size on account of its great height. As the diameter of a tree increases, the annual increase of circumference gives a larger square of timber, and an inch a year, after about 90 or 100 years, is an unusual growth for an Oak to accomplish. But an inch a year up to 80 or 100 years may probably be attained on any Oak-growing soil. What beautiful clumps and plantations of this noble tree might quickly be obtained by any planter who chose to combine ornament with utility! I do not now propose to consider the subject of Oak timber from an economic point of view, though the data I have given may be applied either to its financial or ornamental aspect.

The Elm.—One of the sites most easily improved, so far as ornament is concerned, by arboriculture is a flat coast bare of timber. In travelling through several villages on the South coast lately, the sea lay on the right, at a mile, or less, according to the winding of the road, and, throughout the day, the bright and sparkling water was always in full view, looking its very best and bluest. Still I could not help observing, notwithstanding the fine weather and the pleasing character of the road, that Nature just there needed foliage to relieve her bareness. Beauty should be clothed. The picture of Phryne at the Academy a few years since was very beautiful, but this same figure artfully adorned would have proved as much more attractive to the eye of taste as a planted coast is superior to a naked one.

At the close of my journey I reached a village full of shrubs and timber, with an old-fashioned inn by the roadside, just half a mile from the sea. There are lodge gates in the centre of the village, and a park stretches from that point to the sea. Three fields off I had left a vulgar flat, with its hedgerow Elms all mutilated and miserable, and here was a place embedded in foliage.

I had left behind a village devoid of taste, a pot-house place, with a public-house one would not care to enter, and I had here reached an embellished village with a capital inn. Blessings on the proprietors of this place! Looking out from a delicious bower, hidden among honeysuckles and roses, in the garden of the inn, the residence of the principal landowner is seen, standing amidst noble Elms. The Elm grows fast on this rich diluvial soil, but such trees could hardly have been produced in less than a hundred years.

A thick belting was the first step here towards obtaining timber and when once the prevailing wind had been planted out, the rest was easy. Passing beyond the lodge gates I found a double avenue of Elms leading to the house, and beyond it a park of 150 acres doubled in apparent size by clumps of Elms, and bounded on the west side by thick beltings. A pretty herd of forty Alderneys finds here just the climate they prefer, with the sea at hand, as in the Channel Islands, and on asking for their homestead I was taken into the midst of what seemed an ornamental clump of hedged-in Elms. Within I found the stockman's cottage, a byre, dairy and garden, closed on all sides except the south, or rather south by east, by thick Elm walls, sloping from the front to a height of 20 ft. The English Elm is the best tree for seaside planting, except, perhaps, the Ilex Oak, and in the whole of that district lying between Worthing and Portsmouth it is the chief defence of many a pleasing village. The Elms were planted first, and, after the Elms, and sheltered by them, came the less hardy trees and shrubs which grow in that fertile district in profusion.

This small-leaved English Elm (*Ulmus campestris*) is the well trodden and begrimed Elm of the London parks, a favourite of academies, admired at Oxford and Cambridge, and in the precincts of many of our most noted country houses. It was the Elm of Pliny, and is still the Elm of Italy, and the common wayside trees of France, the Rhine countries, Savoy and Switzerland. It forms the avenues of Madrid at the Escurial, having been sent from England by Philip II., though native probably in Spain. The tree is Protean in type, varying in the leaf in different sites and soils, as all travellers in the south of England must have noticed. It is particularly plentiful in the valleys of the Thames and Severn, but it grows everywhere south of the Trent; more rarely north of it. In the north it is undoubtedly an introduced tree; in the south it was long held to be a doubtful native, probably imported by the Romans. The imperfect ripening of a portion of the seeds cannot be accepted as adverse evidence since, the same defect appears in Italy.

Although the small-leaved Elm grows fastest on good ground, it affects poor soils as well as rich, and abounds everywhere in groves and hedgerows. It is, as I have said, in speaking of coast planting, an admirable shelter tree, and an excellent nurse. It needs no pruning, but it will submit to great brutality in that respect, and suffers topping and lopping patiently till it becomes a naked stem surmounted by a bush. It bears transplanting well, and it will bear, too, a burden of many feet of earth about its trunk, which would kill any other tree by burying the roots too deep. The timber is most useful for naval purposes, blocks, dead eyes, and other furniture of the rigging. It never cracks nor splits. The foliage—massive, but not too heavy, with bright green leaf—is the first to afford shade in spring and the last to assume the yellow tint of autumn.

The Wych Elm is a fortnight later in coming into leaf than the other, has much larger leaves, does not throw up suckers, ripens seed freely, is less pyramidal in growth, and loses its central column with mature growth, spreading with divergent limbs, a magnificent head, and rampant, heavy foliage, which becomes pendulous, and hangs in rich festoons. It delights in the glens and denes of Scotland, in rich, loose soil, formed by the *débris* of rocks, and in moist alluvial ravines, drained by a stream into whose current it sends its tough roots. Huge excrescences frequently cover the trunk. Gilbert White describes a Wych Elm with eight loads of timber, measuring 24 ft. at seven feet above the ground. The Trysting Elm in Teviotdale measured 30 ft. at four feet from the ground. Fifty years since, Evelyn measured a Wych Elm at Bagot's Park, 120 ft. long, weighing 97 tons. Its diameter was 17 ft. at the ground.

An extraordinary Elm at Crawley measures 70 ft. in height, by 35 ft. round the hollow of the trunk, which forms a chamber in which a dozen may dine. Two hundred persons have dined at tables set beneath the branches of one of the largest thriving Wych Elms in England, at East Sheen, the height being 110 ft. Elms dislike smoke, and Sir Francis Bacon's trees in Gray's Inn Walks, planted in 1600, were decayed within 120 years, and replaced with planes. The Elms of the Long Walk at Windsor are now in their prime at 150 years old. Even when leafless—off duty, so to speak, and no longer in the parade of their full foliage—they are beautiful. The synonyms of the Wych Elm (*Ulmus montana*) are the Mountain or Scotch Elm. Its favourite sites—since I have not particularly mentioned them before—are river sides, and wherever water can penetrate freely through the soil. On dry gravels and clays, or on soils with a chill, stiff and poor subsoil, it may thrive for a time, but the stunted form, and the yellow hue of sickness will finally expose the error of the planter in selecting the wrong tree for the site. If it be planted too thickly with other trees, it exterminates them by its shade, owing to its spreading habit. The name Wych, an old English word signifying *strong*, was probably conferred upon it from the character of its timber.

About forty places in England were named from the Elm, showing what an old favourite it is. Among famous Elms are those at Longleat, Sion House, Hatfield, Lord Bathurst's Park, Cirencester, Easby, and Richmond, Yorkshire; and those in the London parks should be mentioned, though their size is not remarkable, comparing them with the giants elsewhere. A touching history belongs to a couple of Elms in St. James's Park, standing near the entrance to Spring Gardens, and familiar to the millions who come down for the parades or inspections which are often held in the space close by, opposite the Horse Guards. The trees were planted by the Duke of Gloucester, brother to Charles I., and in walking down with his guards from St. James's to Whitehall on the morning of his execution, the unfortunate monarch pointed to the trees, and remarked that his brother was their planter. They have never thriven well.

The Beech.—The exclusive Beech overshadows other timber on dry hills, in the Chiltern Hundreds, the Blenheim Woods, and those of 'Sylva' Evelyn at Wotton, and on the chalk ranges and coral rag in the central parts of the country. It is indigenous in these districts, and arrived in Scotland and Ireland in the sixteenth century. Perhaps I may quit these shores for a moment to observe that the Beech covers the southern slopes of the Alps, having the Silver Fir as a *vis-à-vis* on the opposite and colder aspect. The beauty of the wide-spreading Beech of Virgil was denied by Gilpin, who could have never seen, one might suppose, Evelyn's Woods at sunset, or the Burnham specimens, in which Gray delighted, or those in Windsor Park, where there is a girth to record of 38 ft.

The Beech is undoubtedly a native tree, but not wide-spread in England, or known in Wales, Scotland, or the Lake District, except by introduction. The late Mr. Hewett C. Watson, in *Cybele Britannica*, remarks: 'It may be said that the Beech is certainly native in the provinces of the Channel and Thames, probably so in those of the Ouse, Trent, Mersey, and Severn; also in the Peninsula, at least in its most easterly county of Somerset.' It ascends to an altitude of from 100 to 200 yards in England.

Sir T. Dick Lauder, one of the editors of *Forest Scenery*, has explained that Gilpin's depreciation of the Beech was the error of an artist, his love of the pencil led him astray; that is to say the Beech is not an artist's tree, and does not occasion pleasurable associations in an artist's mind. The excuse is graceful, but a little lame, for if a Beech be 'one of the most magnificent objects of God's fair creation,' as Sir T. D. Lauder admits it to be, the true artist must needs be its admirer.

I have always thought the Beech one of the most interesting trees. We cannot free ourselves from prejudice, and I must admit a strong prejudice in its favour, since I was born in a beechen country, and the tree is inseparably connected with my fondest recollections. Is there a tree with a leaf more exquisite and delicate at its first bursting from the bud? Is there a tree with smoother and more graceful trunk, stained and tinted more attractively? Then how gloriously the pale Beech trunks reflect the golden colours of sunset! Two forms of the Beech are common. In the neighbourhood of our village we had the spreading Beech, with short trunk, and the tall Beech of the woods elegant as the Palm itself. Strength and grace are well represented by those two forms of the same tree which have gained for the Beech the opposing names of the Hercules and Adonis of our Sylvas.'

The exit from one part of our village was by a deep lane with steep banks held up by the strong surface roots of spreading Beeches. The trees grew on the top of the bank. What a canopy of light green leaves they spread overhead in spring, and how gloriously the sunlight came shimmering through! At another season, six months later, the dry leaves rustled knee-deep in the lane below. Beech leaves were formerly used, by the way, for stuffing beds, and are much better than straw for that purpose. Evelyn lay on them in Switzerland, and Sir T. D. Lauder, after mentioning the excellent mattresses made in Italy and filled with the elastic spathe of the Indian corn, says, 'But the beds made of Beech leaves are really no whit behind them in their qualities, whilst the fragrant smell of green tea which the leaves retain, is most gratifying.' This is beyond my experience; but I do know that the ring-doves coo-ooed deliciously from among the Beeches many years ago, and that even now the sight of the trees, when I revisit that neighbourhood, reminds me of their coo-ooing and I seem to hear the well-known sound even when the birds are silent.

I mentioned the roots of the Beech. The phenomenon they sometimes present must be familiar to many persons. They ran over the steep sides of the lane as if they had been poured down in a molten state, so that for a distance of many feet from the base of the trunks the steep slope was corrugated with them. But the term I have used needs correction; for a growing tree cannot maintain its roots above the ground, and when some accident exposes them, they soon cease to be roots, and assuming a covering of bark, they increase in size in future, and grow as stems with the growth of the tree. This had happened in the case of the Beech trees on the steep slope of the lane where the washing away of the soil had exposed the network of surface roots, and produced the curious though not uncommon appearance which I have just described.

A peculiarity in thick Beech woods is the exclusion of all undergrowth by the dense shallow mass of roots and the shade of the thick foliage; and I well remember the general surprise of persons familiar with the Evelyn Woods, near Dorking, when snow and wind overturned several acres of great Beeches, and the bare surface became covered in a single year with a thick growth of Birch. The succession crop appeared as if by magic: but how? Evelyn planted the Beeches; who planted the Birch? I suppose it had been self-sown, but Evelyn has left it on record that Oak woods had covered the ground which he and his brother planted with the existing crop of the Wotton woods, so that the Birch seed must have been sown many centuries ago. The truffle, which are common in some old Beech woods, were found in our district, but the dogs, or pigs, trained to hunt them, were wanting.

The Beech is inferior as timber, but excellent for fuel, and is said to make good charcoal for gunpowder; though we had powder mills on the stream two miles below our village, and the Beech was not there used, the Alder being preferred. As an occasional visitor in Bucks, I have wandered among the Beech woods of the Chilterns, seen Hampden's house, deep among the thick woods, and other memorable places where Beech trees grow, as Bulstrode, Hughenden, Beaconsfield, Penn, Dropmore, and Stoke Poges, with Wycombe, where the chairs are made. There are, however, no Beeches in Bucks worthy of more respect than those in 'Burke's Grove,' planted by Edmund Burke as a shelter to his house. The statesman's house has been destroyed by fire, but the trees remain fit memorials of one who very wisely selected for his planting operations a tree native to the neighbourhood and better suited to it than any other.

HENRY EVERSHED.

CATALOGUES.—We have to acknowledge the receipt of a catalogue and price-list of plants, forest trees, &c., from Messrs. Cannon and Brace, of Les Vaux near Salbris (Loir-et-Cher) France.

APPOINTMENTS.—Mr. George Dodds, who was lately on the Collon Estates, County Louth, Ireland, has succeeded Mr. Andrew Slater, as Forester on the Wyreside and Wyredale Estates, near Lancaster.—Mr. J. T. McLaren, lately manager of the Cavers Estate, near Hawick, has been appointed Local Factor for Lord Balfour, of Burleigh, on his Clackmannan Estates. Mr. McLaren received his early training under Mr. D. F. Mackenzie on the Murtly Estates, Perthshire, afterwards changing to Scone Palace, as foreman to Mr. M'Corquodale, and subsequently being appointed a manager on the Cavers Estates.

EDINBURGH BOTANICAL SOCIETY.

AT the November meeting of the Edinburgh Botanical Society, a large stem about six feet long of *Phormium tenax*, the New Zealand Flax, grown at North Ronaldshay, one of the Orkney Islands, was exhibited by Mr. William Traill, M.D., of Woodwick. The seeds sown there in the open air had flowered and ripened three times, viz., in 1879, in 1881, and in the present year in the beginning of July. In New Zealand this plant is said mostly to flower only in the third year.

The Rev. David Lands, borough of Kilmarnock, also reported to the same meeting on the growth of half-hardy plants in the Island of Arran, Buteshire. The Peppermint tree (*Eucalyptus amydalina* of Tasmania), the tallest tree in the world, grows at two places in Arran. The specimen at Cromla, Corrie, is 22 ft. in height and 93 ft. 8 in. in girth five feet from the ground. The Blue Gum (*E. globulus*) grows at Lamlash as well as the White Gum (*E. coriacea*, and the Cider Gum (*E. gunuii*). The Victoria Palm grows luxuriantly at Cromla; Corrie, of three species; *Cordyline indroisa; C. Australis* and *C. Veitchii*. The Black Wood of Australia (*Acacia melanoxylon*) flourishes at Cromla, Corrie; so does the Feather-leaf, or Black Wattle (*Acacia decurrens*), and the Norfolk Island Pine at Lamlash.

One of the prominent scenic effects of the month in the Edinburgh Royal Botanic Gardens, Mr. Lindsay, the Curator, reported had been the autumn tints. The most beautiful were those of *Acer saccharinum, A. rubrum, A. monspessulanura, A. Lobie*, and the varieties of *A. pseudo-platanus, Quercus rubra, Q. conferta, Pyrus aria*, and *P. vestita, Salisboria* Beech, and Tulip tree, *Ampelopsis*, Azaleas, Mahoneas, and Weigelias, &c. Amongst herbaceous plants *Saxifraga purpurascens* and *Funkia siefolitii* were most striking. A few evergreens also showed rich colouring and contrasted favourably with the more beautiful but shorter-lived deciduous coloured leaves, amongst such may be mentioned *Cryptomeria elegans, Thuja elegantissima*, and Durea, golden and silver Hollies, and the various Japanese Retinosporas. The season, though favourable for the development of leafage, has apparently been most unfavourable in developing flower buds for next year. Rhododendrons, Azaleas and other American plants which are usually lifted about the end of the month for forcing purposes have not for many years been so deficient in flower buds, Yew, Holly, and Cotoneasts have a fair crop of berries, which are now well coloured.

ENGLAND.

THE meteorological phenomena of December are often a continuation of the characteristics of the preceding month. In some years dry bracing frosts prevail; in others it may present a series of fogs and cold drizzling rains; and in a few it presents the clearness and mildness of autumn; but generally towards the close of the month we expect all the stern, stormy and relentless characteristics of winter.

The mean rainfall is 2½ inches, and the evaporation about two-thirds of an inch. During December last year (1882), the actual rainfall at Clifton, near Bristol, was 4·45 inches, and at Chewton Priory, on the edge of the Mendip Hills, the rainfall was 7·60 inches.

ORCHARD.—Continue the planting and pruning of fruit trees while the weather continues open, and finish pruning Gooseberries, Currants, and Raspberries. Dig up roughly all stiff soils, and expose to the action of the weather during winter. Secure the supports of lately planted trees, and strengthen and repair tree guards.

FENCES.—Continue to act upon the instructions given last month, pushing on all kind of fence work, as the weather will admit.

WOODS AND PLANTATIONS.—Continue forest planting as the weather will admit, but do not attempt planting in frosty weather, nor in wet portions of land. Select the driest portions of ground for earliest planting, and leave the dampest ground for the last.

Evergreen shrubs should not be transplanted during this month, as none but the hardiest of these can be moved about with impunity at this season.

Continue the thinning of plantations and the cutting down of underwood, and push forward the felling of timber for sale, or for use on the estate. Large quantities of timber placed upon the market after this month, if much scattered amongst fields and hedgerows, cannot conveniently be removed before the advent of spring would demand the suspension of hauling operations, especially through fields under crops of any kind.

ROADS should be attended to and repaired where necessary. Break all stones before laying them on the roads, and avoid the reprehensible practice, sometimes adopted in the repair of country roads, of tipping down the rough stones and breaking them after being spread over the surface to be repaired. This method is most unsatisfactory in its results, for ease in traffic, and in durability.

DRAINS AND WATERCOURSES.—Continue the drainage of agricultural lands, and examine all existing drains, keeping their outlets open, and removing obstructions.

Examine all open wood-drains, ditches, and watercourses, clearing out accumulations of leaves, or other obstructions that might cause them to overflow.

PLEASURE GROUNDS AND NURSERY.—Accumulations of damp leaves on the grounds around a mansion add to the discomforts of the season, whilst the evaporation from them is inimical to the health of the inhabitants. Therefore do not allow such accumulations to remain, but clear them as quickly as possible to the proper depôts for rotting them into manure.

Collect cones of the Larch, Scotch Fir, &c., and also berries of the Hawthorn, Mountain Ash, Holly, and keys of the Ash. Mix these berries and keys with sandy soil, and pit them where they can be occasionally turned over every two or three months. Look over seeds already stored. Plant cuttings of deciduous trees, and plant out layers of Planes, Limes, &c. Turn over roughly, or ridge up vacant nursery ground, that it may become enriched and pulverized by the action of the weather.

Hunstrete, Pensford, Bristol. A. PATERSON.

SCOTLAND.

THE weather of October—and of November up to the time I write—has been very favourable for planting operations, and has afforded opportunities of pressing on the work of transplanting advantageously. Although the work may be continued with care, in fairly open weather all the season through, this month is not generally—especially the latter half of it—so desirable for the carrying on of these operations, and where they can be conveniently accomplished later on, they might be deferred for a time, unless where very dry soils have yet to be cropped. The transplanting of evergreen shrubs should at all events be suspended, and all necessary preparations for spring planting completed as soon as possible.

The thinning of young plantations from which saleable stuff can be taken should be pushed on, as this is the season that the produce of such can best be disposed of. I might here remark that line cutting and careful peeling should be insisted on. The leaving of high stumps or stools is not only a loss of timber, but they soon become very unsightly, and even dangerous to locomotion.

Fell hedgerow timber, and root out standard trees from policy grounds, fields, &c., where desirable, so that the whole may be removed during dry or frosty weather.

Mark and dispose of Birchwood to be felled during the season, and deliver as required or agreed.

Cut and manufacture, as far as possible, a supply of timber for estate purposes. Too much of our home timber is used in the erection and repairs of buildings in a green state; its lasting qualities are thereby deteriorated, and very frequently unfairly represented.

Continue the dressing of hedges; remove accumulations of leaves from drains where their presence is likely to cause flooding; and collect all convenient for compost. See to th conditions of roads, clean up mud and leaves, and lay gravel or metal where required.

In the nursery continue to turn over roughly or ridge-up ground as it becomes vacant. Plant layers and cuttings of deciduous trees, and forward general nursery work as much as possible.

The cones of Larch and Scotch Fir may be collected by the middle of the month; and also the berries of Hawthorn, Holly and Mountain Ash.

In my last month's notes, instead of 'Seedlings, in my opinion, should not be laid in the spring' please read, *until the spring.*

Darnaway, N.B. D. SCOTT.

IRELAND.

THE work of tree planting ought by this time to be well advanced, so that the work will be well in hand for the spring month. Continue the felling of heavy timber, trimming shrubberies, and making alterations, also arterial drainage. Prepare material for repairing roads, and as horses are generally available this month, have road metal carted to depôts convenient to where required. Raise gravel for avenues and walks, and forward such work as much as possible before the end of the month. Planting in the nursery should never be omitted during favourable weather, but ought not to be gone on with if the ground is wet or claggy. On estates where a saw-mill is used, much may be done during stormy days cutting fencing and fuel ; fencing should always be cut a season before being used. By this means the material is well seasoned, and when coated with paint lasts much longer than if used in its fresh state. There is nothing so economical as a plentiful supply of well-seasoned timber on an estate, and the present month is one well suited for providing it.

Open watercourses should be gone over and all obstructions from leaves, &c., removed : the fall of the leaf renders this very necessary.

Tipperary. D. Sym Scott,

WALES.

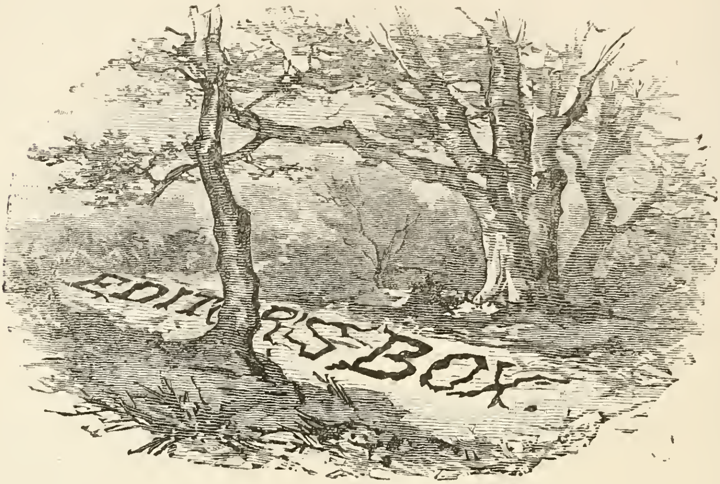
With the exception of a few nights' frost towards the middle of the month, followed by heavy rain, the weather during November has been very favourable for conducting planting operations, the frost at no time delaying planting longer than a few hours in the morning. Under the circumstances the planting of trees and shrubs will be in many cases well advanced, and where such work is on a limited scale, it should if possible be finished by the middle of this month. However, where there is a large extent of planting on hand, it will be necessary to continue the work throughout the month, during open and favourable weather. When unfavourable for planting ; the workmen may be employed draining roads, roadmaking, forming hedge-beds, and otherwise preparing ground for planting, continue the brushing, and cutting of underwood, the thinning of plantations of all sorts, and the cutting down of hedgerow and other timber trees. Bind up faggots, and prepare firewood, and take advantage of frosty weather to remove plantation produce and other timber.

All roads, drives, and walks should now be put in thorough repair, giving them a good coating of well-broken stones, or gravel, as circumstances require, finishing off with a smooth surface, so that water will not lodge on the road.

Attend to the outlets of drains and open ditches, and see that they do not get chocked with leaves, which are blown about at this time. Coniferous and other evergreen trees and shrubs will require attention during snowstorms, shaking off the snow to avoid its weighing down and breaking the branches.

Trench and turn up all vacant ground in the nursery, and remove leaves, &c., to the compost heap. Sweep up leaves in pleasure grounds, and roll grass lawns and walks.

Kinmel Park. Lewis Bayne.



TIMBER HISTORY FROM IRISH BOGS.

SIR,—To all those interested in the improvement of peat bogs, Mr. Archibald Henderson's article in your October issue must be of considerable value.

It is interesting to hear of such fine Scotch Fir trees growing on well-drained peat bogs. Perhaps Mr. Henderson will kindly let us know :—1st, If any Larch, Spruce, Silver Fir, Birch, Hazel, and Alder are growing along with the Scotch Fir. 2nd, The previous treatment of these trees as to planting and thinning. 3rd, How much better do they grow on the gravelly or clayey soil close by than on the moss. 4th The height above sea-level of this plantation. 5th, Its exposure. 6th, Its surface herbage. 7th, Its depth of moss. 8th, The description of subsoil on which the moss rests. 9th, The number of horizontal layers of Scotch Fir found herein, showing so many generations of forest trees have grown and died there. 10th, The probable ages of the trees in each of these layers. 11th, The distance apart of each horizontal layer of roots.

Fir roots are found in great abundance in bogs here, and cross sections can be got showing from 200 to upwards of 300 concentric rings. The natives used for ages to dig up bog Firs, with which to build their houses, some pieces of which were from 60 to 70 ft. long, and of girths in proportion; and this about 600 ft. above sea-level.

We often, in our drains in peat bogs here, see the water 'red and rusty-looking,' but always regarded this as an indication of the presence, not of the carbonate, but of the oxide, or rust of iron. Carbonate of iron being that description of iron ore found frequently in the vicinity of coal, its specific gravity is about 3·5, and it must, therefore, sink in water, being over three times its weight.

M.

LARGE PLANTATIONS.

SIR,—I quite agree with Mr. Henderson ('FORESTRY' for October, p. 433), in thinking that 'proprietors who have large estates in wild mountain districts should plant extensively, as woods in large masses grow faster and pay better. Narrow strips and miserable patches here and there may afford a little shelter, but seldom yield much revenue.' As a general rule patches, say of an acre, or as near as possible to 70 yards square, in exposed mountainous districts, suffer from prevailing winds, more or less, to a breadth of about 10 yards at least all round, thus requiring about the one-half of the acre to shelter the other half; whereas, a plantation of 2,000 yards square, containing 826 acres, might by the same breadth of 10 yards all round, have 810 acres sheltered thereby within it. But the most serious drawback of all to the small plantation is the relative cost of fencing; for example, fencing one-acre plots at, say, a shilling per running yard of fence, may cost £14 per acre; whereas, the 826 acres at the same cost per yard, may be fenced at under 10s. per acre, and a larger square area would cost still less.

Nor does this large expenditure per acre on the small plantation fences end here, as in a sense it is only beginning, because such fences have to be always looked after and maintained, and with so much greater care, because a given number of stock can feed all over the small areas, and destroy the young trees in very much less time than in the large areas: £100 can therefore be much more profitably spent in fencing a large plantation, something similar in size and shape to the example given, than £2,800 can in plantations of only about an acre.

A time comes when these trees are matured and offered for sale, and the intending purchaser not only looks at the standing timber, but, among other things, looks out for a suitable site for his portable saw-mill; and in doing so, he remembers the fact that 100 tons of timber just felled and ready for sawing, will only turn out about 50 tons of saleable sawn timber, the other 50 tons having been lost in waste and evaporation of moisture while seasoning. It is here self-evident how much more costly it is to manufacture the produce of small scattered plantations, when compared with large compact ones, in consequence of the heavy extra cartage.

Dunrobin, Golspie, N.B. D. M'CORQUODALE.

PLANTING FOREST TREES.

Sir,—In p. 67 of your last issue, Mr. D. Scott says: 'On all soils with a grassy surface the turf should be pared off before the plant is inserted.' Extensive planting is carried on, let us suppose, on the same description of soils and situations, but on two different estates. On the one, when the planters pass through heather and come to grass, the first thing they are supposed to do is to pare off the turf where each plant is to be inserted before making the notch for it, thereby taking as much time to plant ten in the grass, especially if the soil is rough and stony, as it took them to plant 100 in the heather. In the adjoining estate the plants are also planted at an average distance of 3 ft. apart, but when they came to grassy lands, in place of paring, they plant into irregular rows 3½ ft. apart, and 2½ ft. between each plant, so as to make it easier to trace out the plants in the grass, thereby planting in a given time, both in heather and grass, the same number of plants. When summer comes, and the plants are getting choked up with grass, they get people who will be very glad to clear the plants for nothing if they but get the grass. Query: Which of the two ways is the best and most profitable?

Mr. Scott further says: 'In all extensive enclosures, spaces for main roads should be marked off and left unplanted, and when the weather is unfavourable for planting, the hands employed might with advantage be occupied in forming these roadways.'

Extensive plantations are in progress in two different estates, in good hill pasture. In the one, roads are pegged off five to six yards broad, previous to being planted, causing a loss to the plantation of about two acres per mile of road; and when the weather is unfavourable for planting, the hands are employed at the making of these roads, at a cost of, say, £200 per mile, or £100 per acre. In the adjoining property they never think of roads, but plant straight on, and in order to employ the planting hands in weather unsuitable for planting, they are employed in the cutting of drains in some sheltered place. When the young trees grow up to from one to three feet high they then tell best where the worst soil is, and here, where all other considerations are equal, the road is pegged off, and the plants, growing along the site of the road, that have been so well acclimatized, are lifted with small balls of earth and planted where necessary, at the rate of about £2 per one thousand, and the road thus cleared is at once a shooting path, and is only constructed into a road for timber-carting purposes, say, 20 years after the plantation was planted, thereby effecting a saving of the compound interest on £200 for 20 years, which might amount to another £200. Query: Which of the two ways would be the best and most economical?

Loanleah.

TREE PRUNING.

SIR,—Under the heading of 'Forest Work for the Month,' in your August issue, Mr. A. Paterson, in his valuable directions, says: 'In ordinary practice in well-managed plantations, large branche are seldom removed close to the bole; but in cases of necessity this is a good season for performing the operation, as the wound readily heals when made about this time.' Will Mr. Paterson be so kind as to say if the removal of large branches, say a foot in diameter from the bole of trees 2 ft. in diameter, leads on to the injury of the health of trees, even should the wounds thus caused be carefully painted or tarred over, and if such wounds would more readily heal if done in August than if done in December or January?

From what Mr. Paterson says regarding the state of the grove of trees of which he speaks, there is but little room left us to doubt for one moment but that the blemishes in the timber were all due to the crowded state in which the trees were grown, having killed the large side branches, which gradually decayed and dropped off, and yet there may be a possibility of large sums of money having been spent in the pruning of these same trees, after a fashion, at some time.

Many years ago, when passing along a road some miles out from Carlisle, I saw some men pruning some Oaks 15 ft. to 20 ft. high, by first starting with a few of the strongest lower branches, which they cut off from 6 in. to 18 in. in length out from the bole, and it appeared to be no object with them whether cut at a live branch or not. In coming up to where the men were at work, I saw that most of the branches so pruned were quite underneath those above them, and therefore shaded by them from the sun's rays. I called one of the men's attention to the way they appeared to me to *disfigure* the trees by their mode of pruning, and he said that was nothing to the good it did them, as the vital forces of the trees by such pruning were directed, not to the making of superfluous branch timber, but upwards, to make good useful trunk or bole timber. His reason for not cutting these stumps off by the bole was in consequence of the injury such treatment would do the bole. I passed on and began to digest this mental food. My knowledge of vegetable and animal biology is no doubt very limited. It therefore may be entirely due to this that my imagination failed to conjure up anything that could justify such torturing of these trees, with a view to accomplish any useful purpose. It appeared to me like cutting the left arm of a promising schoolboy, so as to cause so much more of the roast meat and plum pudding he ate to pass by the making of a strong arm upwards, to make a larger development of brain; but as this idea, had it occurred to the pruner, might only discourage him in his art, my imagination went, therefore, in search of another way of accounting for this pruning. The fountains of a flower-garden may be defective, not through the water disobeying the laws of gravitation, but through the engineer having badly adapted its different parts to suit their purposes, the result being that when all the jets and sprays were on, the results were disappointing; but when all were cut off from the main pipe with the exception of one or two of the principal ones, thus stopping a waste of water, then with this additional force those left act all right, and thus far the pruner may have learned his lesson from the water-fountain; but, as the water did not add to the length of the brass nozzle through which it passed, the trees and fountains could scarcely bear comparison with each other.

Time passed on, as it always does, and at the end of a few more years, I again found myself passing along by the same road and same trees, and wished the pruner had then seen the results of his handiwork. Here I found many of the stumps decayed and dropping off in small fragments, with the live tree-fibre annually growing round them, thus forming rings or cups round decayed centre-cores, which caught and retained moisture, to accelerate the decay, while others were healed over, leaving it to my imagination to picture the rottenness it so delusively covered, and a third class of these stumps were one mass of small spray, with parts of the bark rotted off, all in a fair way, apparently, to deceive some unfortunate purchaser some day.

A Tourist.

PROTECTING TREES FROM GOATS.

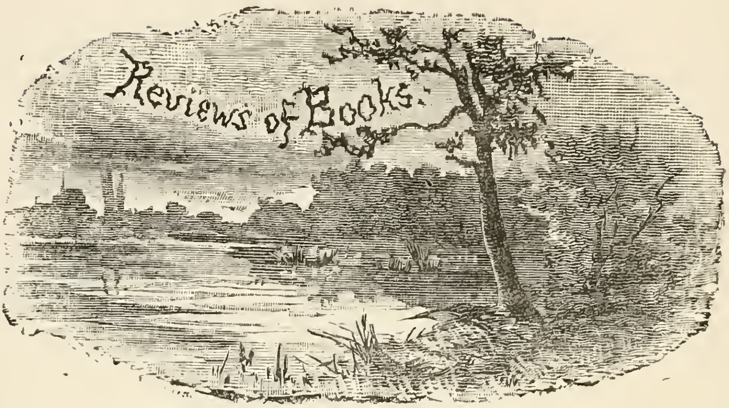
Sir,—I observe in your number of 'Forestry' for November an inquiry as to trees suffering from the effects of having been painted with coal tar, as a preventive of the ravages of goats. To say the least of it, I think the practice a very improper one, as all who take an interest in trees know that anything that binds the bark, or closes the pores, is certain to injure the tree. Coal tar, being a strong binding varnish, does very well for wooden erections, but not for growing timber. Another thing—chemically speaking—is that coal tar contains a large amount of creosote, and consequently must injure a tree.

I would suggest the following remedy for removing coal tar; namely, whale or seal oil foots and coal tar naphtha, one part foots, and three parts naphtha, which can be laid on with a brush, and when the coal tar becomes soft on the bark, the whole may be washed off with paraffin oil. I have no doubt, had it been summer-time, the tar would have become softer sooner. But as it is, I hope the foregoing suggestion will have the desired effect. The foots may be got from any oil-store at from 1s. 6d. to 2s. per gallon, and the naphtha at any tar refinery at about 1s. per gallon.

After the tar is removed, the part of the tree that had been so tarred, may be rubbed over with the oil foots alone, and this should be allowed to remain on, as it will have an influence in counteracting the effects of the tar and its poisonous contents.

N. AHLBOTTN.

THE ONTARIO FORESTS.—At the instance of the Government of the Province of Ontario, an exhaustive report upon the necessity of preserving and replanting forests has just been compiled by Mr. R. W. Phipps, of Toronto. The subject is one in which increasing interest is being shown in the Dominion, and the report in question deals with it very comprehensively. The writer first calls attention to the vast wealth the province originally possessed in its forests. When the paddles of the Frenchmen first broke the waters of Toronto Bay, he remarks, Ontario, from the Detroit to the Ottawa, was under the roof of the forest and contained, in the opinion of one of the best qualified judges in the United States, perhaps the most valuable masses of timber which ever existed in a region of its size. Pine, Maple, Beech, Ash, and White Oak were possibly most prominent, but Hickory, Hemlock, Ironwood, and the Silver Birch were scarcely less abundant. The early settlers, however, directly after arrival began the work of destruction with a ruthless hand. They required the land, and there was no demand for timber. Hence square mile after square mile of forest was destroyed by fire—a process which went on for years, and which has been followed up by the operations of the lumbermen. The result is that the cultivated portions of Ontario will speedily become almost denuded of trees, while the lumbermen are compelled now to go great distances for the superior quality of Pine which they used to get much nearer home a few years ago. Apart from any consideration as to the future of the lumber trade which it may suggest, this state of things is obviously of much significance to the agriculturist; and it is chiefly this aspect of the matter which is discussed in Mr. Phipps's report. The consequences are, indeed, likely to prove so serious that, in the opinion of the writer, the whole of Ontario is in great danger of heavy loss, unless action be taken in time by the authorities. At the close of a somewhat elaborate inquiry, the report recommends the preservation of the higher lands in forest, and the acquisition and replanting of such lands where they have been already cleared; economy in the utilization of the great forests in the north-eastern and north-western portions of the province; the adoption of adequate measures for protection against forest fires; and lastly, the planting of trees, as 'wind-breaks,' on highways and along the dividing lines of farms. By these means it is thought the climatic influences of the forests may be preserved, and the lumber supply, &c., maintained in perpetuity. What action the Ontario Government may take on the strength of these recommendations is not yet known, but their appreciation of the importance of the subject is shown by their authorising the gratuitous distribution of a large number of copies of the report among the farmers of the province.


Reviews of Books.

Familiar Wild Birds. By W. Swaysland. First Series. With Coloured Plates. Cassell and Co., London, Paris, and New York. 1883.

The great and deserved popularity of those really beautiful publications, 'Familiar Wild Flowers' and 'Familiar Garden Flowers,' doubtless suggested the charming volume before us. Let us say at once that we have seen no illustrations of wild birds that equal the merit of these. They are in truth exquisite delineations, and author and publishers are entitled to the highest praise for the production of so delightful a volume. The author says in his preface: 'How much the charm of country life is due to the song of the birds, it is very difficult to realise. And still less generally known is the wonderful variety of bird life in even hyper-civilised England. By many a country lad every hole and every bird seen is alike known and recognised, but to many of those whose daily walks are limited to the stone pavements of our large cities, save that they probably know a robin and a sparrow when they see either, a bird is simply "a bird" and no more. To portray the many varieties of birds which yet visit, breed in, and live in England, to describe their haunts, habits, eggs, and appearance, is therefore a pleasant task which may perchance add many a fresh charm to their brief experiences of life.' How excellently Mr. Swaysland has accomplished the task he has set himself, a glance at this first instalment of his book will suffice to show. The illustrations are, of course, the prominent feature of the book. These include exquisite figures of the following birds: goldfinch, magpie, bullfinch, starling, chaffinch, raven, linnet, rook, common wren, jay, house sparrow, jackdaw, common grouse, kestrel, robin, redpoll, ringdove, wryneck, golden-crested wren, white-throat, thrush, siskin, greenfinch, redstart, teal, nuthatch, blackbird, great tit, common gull, green woodpecker, kingfisher, moorhen, nightingale, lapwing, barn-owl, and crossbill. At the end of the volume is a section on eggs and egg collecting, by R. Kearton, and this is accompanied by a series of admirably coloured plates; which as drawings are of equal excellence with the delineations of birds.

Apart from its value and beauty as faithfully depicting its delightful and interesting subject, this charming volume makes a most elegant and appropriate Christmas present, its handsome binding being fully in keeping with its interior. We most cordially and heartily commend it as an indispensable adjunct to the drawing-room or library.

Trees, and How to Paint Them in Water Colours. By W. H. J. Boot. With Eighteen Coloured Plates, and numerous Wood Engravings. Cassell and Co. London. 1883.

Mr. Boot is one of our most skilful artists, and the delineator of many charming landscapes. He appears, therefore, most appropriately as a guide, philosopher, and friend in the excellent manual under notice. The author gives so much encouragement to young artists, and such abundant instruction, that his work is sure to be of immense service to all who are desirous of painting the beautiful forms of trees. A most important and valuable feature of the book is furnished by the coloured plates, which set before the art student the ideal he should aim at accomplishing. The artist-author and the publishers have placed the public again under obligation by this admirable handbook to a delightful art.

The Journal of the Royal Agricultural Society of England. Second Series. Volume XIX. Part 2. No. 38. London: John Murray.

A mass of useful and valuable information is contained in this bulky *tome*, including, besides the usual budget of 'statistics' as to meteorology for 1883, imports of corn, number of exhibition animals, acreage of various crops and dairy produce, and prices current; articles on half-bred horses for field or road; their breeding and management, by Earl Cathcart; shorthorns in Scotland and Ireland, by James Macdonald, editor of the Dublin *Farmers' Gazette;* Report on Wireworm, by Miss Ormerod; Dairying in Denmark, by Mr. Jenkins, the editor; and Notes on Continental Poultry Keeping, by Mr. Jenkins; the Profits of Fruit-Farming, by Charles Whitehead; on River Conservancy and the Cause and Prevention of Floods; the annual reports of the chemist and botanist of the Society, and a great number of other interesting matter.

We have to acknowledge, with brief reference and a promise of more detailed notice later on, the *Report of the Department of Agriculture, and Statistics of the Province of Manitoba for the Year* 1882. Published at Winnipeg, by R. M. HOWARD JAMES, Printer, 1883; also the *Tropical Agriculturist* for November, and *Progress Report upon State Forest Administration in South Australia,* by J. E. BROWN, Conservator of Forests, Adelaide. E. Spiller, Government Printer, 1883; and *Suggestions Regarding Forest Administration in the Central Provinces of India,* by W. SCHLICK, Ph.D. Calcutta: The Home Department Press, 1883.

We have also received the *Indian Forester* for October, and the *Florist and Pomoloist* for November, containing two beautifully coloured plates.

'HANDS' AFTERNOON TEA.'—Mr. F. Allen, of 36, King William Street, London Bridge, has sent us a sample of his famous tea, which is also known as 'Five Shilling Tea.' Whether tea be good for brain workers or not, no one disputes its eminently refreshing qualities. But it is most essential to obtain it *good.* We have tried this tea, and certainly consider it to be very good indeed.

EUCALYPTUS IN SPAIN.—In a recent report from Malaga it is stated that the cultivation of the Eucalyptus has of late attracted considerable attention in the province of Malaga, which has been deprived of all but fruit trees, in order to supply the constant demand for charcoal caused by the extensive use of the fuel for cooking purposes. Large numbers of Eucalyptus in a healthy and flourishing state may now be seen along the line of railway from Malaga to Bobadilla, and in other places, and they are reported to have been effective, to some extent, in destroying fevers in the low districts, which were formerly uninhabitable. The Eucalyptus trees are also successfully used for avenues, and afford shelter from the sun on the roads near the city.—*Gardener's Chronicle.*

TIMBER SALES.—Mr. H. Walters held a sale at Longton on the 2nd ult., when a large quantity of Oak, Birch, Elm, Ash, and other growing timber, on the Weston Coyney Estate, was offered by public auction. The timber was divided into fourteen lots, and realised the following prices per lot:—Lot 1, Oak, Ash, Sycamore, Beech, and Larch trees, £36; lot 2, ditto, £37; lot 3, 79 Oak and 23 Ash trees, £60; lot 4, Birch, Alder, Elm, and Chestnut trees, £14 10s.; lot 5, 100 Oak trees, £38; lot 6, 60 Oak trees, £24; lot 7, 41 Oak trees, £10 10s.; lot 8, Scotch Spruce, Chestnut, Elm, and Poplar trees, £24; lot 9, ditto, £60; lot 10, ditto, £60; lot 11, ditto, £100; lot 12, ditto, £30 10s.; lot 13, 38 Oak, 11 Ash, and 5 Sycamore trees, £38; Underwood (33 acres), not sold.—Messrs. Sedgwick, Son, & Weall, of Watford, held the annual sale of timber on the Gorhambury Estate, belonging to the Earl of Verulam, at St. Albans, on the 21st ult. It comprised 217 Oak trees, felled, and averaging about 22 ft. in a tree, which realised an average price of 1s. 10½d. per foot; also 24 fine Elms, which sold at about 8d. a foot, and a few Beech and Ash. The principal buyers were Mr. Key. Mr. East, and Mr. Read, of Berkhampsted; Messrs. Foster, Boxmoor; Mr. France, Deptford; Messrs. Longmire & Burge, London; Mr. Walter Rogers, Watford; Mr. Burgoyne and Mr. Miskin, St. Albans.

English Trees in Autumn.—It has been pleasant of late, says a writer in the *Field*, to notice the fine tints of our native trees where anything like a variety are planted. The Tulip tree has been superb in its soft gold, even in London. The Elms as good as any in their fine yellow. Some of the dwarf introduced shrubs and trees are admirable in colour, but usually poor, owing to being seen in very small specimens or numbers, or lost under the shade of a shrubbery. Here and there some one has sense enough to plant such a tree as the Liquidamber, and as a rule the result about the end of October is superb. Our experience of the colour in tree foliage leads us to the conclusion that, if we plant the right kinds, and plant and group them well, as good colour may be had in England as in America or anywhere else. Even in London lately the colour has been superb, about Hampstead, for example. There a Tulip tree in Sir Spencer Wells' place has been a picture of beautiful colour.

The Boscobel Oak.—It is perhaps not generally known, says a contemporary, that the present Boscobel Oak was grown from an acorn of the celebrated tree that afforded the fugitive king shelter after the battle of Worcester. According to 'Boscobel Tracts,' the tree was not blown down, but is stated to have fallen 'a sacrifice to the destructive zeal of the loyal during Charles's brief popularity.' The following extract referring to the subject is from 'England under the Stuarts,' vol. ii. p. 451, 1868:—'Boscobel house is still standing; indeed, it is in almost the same state as when visited by Charles. Unfortunately the Royal Oak, the most interesting of these relics, has long since been gathered to its fathers. An offspring, however, sprung from one of the father acorns, still points out the memorable spot. An iron railing protects it from harm. May it ever be regarded with reverence by lovers of the past!'

A Gladstone Tree.—In September last Mr. Hill, a working-man advocate in Lambeth, wrote to Mr. Gladstone as follows:—'81 Barlow Street, East Street, Walworth, Sept. 3, 1883. Sir.—I am a working-man chairmaker, and have for the past thirty years had a vote for Lambeth, which I have always given to the Liberal candidate. I am going to ask a very great favour from you, which I do hope you will see your way to grant. I have two sons, and I want you to sell me one or two, according to the size, of the Oak, Elm, or any other hardewood trees you have cut down yourself. I want to make my sons an armchair and table a-piece with my own hands, so that they can leave them to their children when they are dead. I shall be willing and glad to pay the price charged by your valuer, and also the railway carriage to London. Trusting you will be able to do so, and hoping you will forgive me the liberty I have taken in writing to you, I remain your obedient servant, H. T. Hill. The Right Hon. W. E. Gladstone.' To this the following reply was received:—

'Sept. 8, 1883. Sir,—Mr. Gladstone has had the honour to receive your letter of the 3rd inst., and desires me to inform you that he will make known the subject of it to his son on his return from abroad, as he regulates matters of the nature referred to. I am, Sir, your obedient servant, G. W. Spencer Lytleton. Mr. H. T. Hill.' Last month Mr. W. H. Gladstone wrote :—'Erskine, Glasgow, Nov. 10, 1883. Sir,—In reference to your letter of September 3, which Mr. Gladstone has handed to me, I beg to ask you how many feet of timber you require. We have a Beech of about 16 feet available, but I fear the carriage to London would be heavy.—I am, &c., W. H. Gladstone.' Mr Hill at once replied, asking that the tree might be sent on, and on Saturday afternoon it arrived safely. It is 18 feet long, and in two pieces. The butt is some 30 in. in diameter, and the weight about one ton and a half. The tree has been cut in the shape of a wedge above the ground and each mark of the axe is quite distinct and clean.—*Times*.

The Deforestation of Russia.—According to a Russian paper, Russia in several of her provinces is threatened with deforestation. The reckless cutting down of trees is threatening to convert into barren deserts some of the best wooded provinces in Russia. A wood famine is threatened in Viatka and Kostroma, and the wood merchants, to satisfy the wants of the southern districts, have recourse to the province of Perm, where the destruction of forests will greatly compromise the development of the mining industry. Since 1864 the Ministry of the Domains has made many attempts to lay down general rules for preserving the forests ; but all these attempts were paralysed by the obstinate and constant opposition of private interests. M. Ostrovsky has now a new project to submit to the Council of the Empire. It is time, in M. Ostrovsky's opinion, to go back to the doctrine of Peter the Great, who placed the Russian forests under Imperial administration. This arrangement was abrogated by Catherine II. in favour of the nobility ; but experience proves that this was a mistake. If the forest question is not speedily dealt with sooner or later it will be found that the destruction of forests is complete in the centre and south of the empire.—*Daily Paper*.

VOL. VII., MAY TO OCTOBER, 1883 OF

FORESTRY was completed with the October Number, and is on sale, bound in handsome light green cloth gilt, beautifully illustrated, price 7/6.

Vols. IV. to VII. of 'FORESTRY' (yearly volumes) are still on sale at 15s. each, bound in green cloth gilt. Vols. I., II and III are out of print.

VERY HANDSOME BINDING CASES for Vol. VII. are on sale at the Publishing Office, at 1s. 6d., or, 1s. 9d. carriage free.

NOTICE TO CONTRIBUTORS AND CORRESPONDENTS.

It is absolutely essential that all MSS. for insertion should reach the Editor *not later* than the 15th of each month, *and at an earlier period of the month whenever possible*. Books for review must also be sent before the middle of the month. Communications for the Editor's Box should be as *short* as possible. The place for long contributions is in the body of the magazine. It is a *great assistance*, both to editor and printers, for MSS. to be well and legibly written, and on one side only of the paper.

We hear that the International Forestry Exhibition is meeting with the usual opposition which all such enlightened enterprises receive at the hands of the ignorant or ill-disposed; and that there is a great probability of its being consigned to an obscure suburb of the northern city through mere captiousness, founded upon some indefensible legal quibble. If it be true, as we have heard, that a legal action is threatened against the use, for the purposes of the Exhibition, of any public park or garden belonging to the city, the public spirit of Edinburgh must have sunk to a very low ebb; and we shall begin to think that the Committee have made a great error in selecting Edinburgh for holding the Exhibition. Even yet, if they would come to London and hold their Exhibition at South Kensington, as we believe was once proposed, we do not doubt but that our Metropolitan authorities would receive them with open arms, and do their utmost to assist them in carrying out with success their great national enterprise.

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Owing, we understand, to the great and totally unexpected difficulties placed in the way of the Committee in securing a good site for the Exhibition, there has been nothing else done during the past month to advance the preparations for it; but in the New Year, with the difficulties about the site overcome, we shall hope, and in an early issue, to be able to lay before our readers some details of its arrangements and of its scope. In the meantime, we are pleased to report that people at a distance are looking with a much more favourable eye on this Exhibition and its outcome than it appears the people of Edinburgh are doing. By every mail letters of application for space, and for information about the Exhibition, are pouring into our office, and still more so into the hands of the Executive at Edinburgh, from every part of the globe; so that the display is certain to be an extraordinary and a universal one. We therefore hope our northern neighbours will endeavour to rise to the occasion, sink all their differences, and make the Exhibition what it should be—a credit to the nation and to Edinburgh.

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One of the most violent storms which have ever visited the forests of this country blew over a great portion of the United Kingdom on the night of the 11th and the morning of the 12th December. The loss of life on land and at sea around our shores has been dreadful to contemplate, and the forester has to deplore the loss of many a noble tree, and hundreds—thousands, probably—of acres of fine, thriving plantations have been levelled to the ground. In recent years foresters have had many severe losses from the same cause; but, so far as we can learn, we fear that this is the most serious of the whole, and that it will be many years before the traces of the wrecks of trees and of woods can be obliterated.

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Few details of the losses caused by the storm have yet reached us, but we shall be glad to get from our correspondents, and from others interested in woods and trees, any particulars they can give respecting the nature and extent of the loss, especially noticing any remarkable trees and valuable woods which may have been overthrown. Information of this kind is always valuable and interesting, and those who furnish it will be doing a public service, whilst themselves reaping the benefit of the experience of others.

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If the losses in our woods have been great from the violence of the storms, there has seldom been a winter more favourable to the operations of the tree-planter than the present. There have been but few days since the winter began in which planting could not be carried on, even in the most exposed places; and we trust that every planter in the country has taken full advantage of the genial season and has got his work in a forward state, so that the trees may have time to 'take hold' of the soil before the parching and swaying winds of March are upon them. Such work performed during the mild weather experienced last month is certain to succeed; and so long as the genial weather continues every nerve should be strained to get planting operations completed as far as possible.

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We are pleased to note, from the report of its recent annual meeting, that the English Arboricultural Society is making fair progress, and we hope that its promoters will persevere with their good work, for there can be no doubt that it must have the effect of stimulating the interest in tree planting in the north of England. It did not surprise us to read in the chairman's speech his regret that the society had not received the support which might have been expected, for some years' experience has taught us the apathy with which all subjects connected with tree-planting are received by the public generally. However, a little energy and perseverance will perhaps overcome this, and we wish the society all success.

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A GLANCE at the budget of catalogues we have received of forest and other trees suggests how easy it is from a pecuniary point of view to adopt the advice given by a Scotch laird to his son, to be 'aye stickin' in a tree'—for the prices asked by nurserymen are remarkably low; a fact that should stimulate the planting of denuded areas. First comes the substantial list of Messrs. William Fell & Co., of the Wentworth Nurseries, Hexham, comprising forest trees, ornamental trees and shrubs, selected trees for gentlemen's parks, lawns, avenues, public parks, cemeteries, &c., coniferous, evergreen, and deciduous shrubs, fruit trees, roses, rhododendrons, Alpine and herbaceous plants, &c. Then we have the bulky catalogues of Messrs. Little & Ballantyne, of Carlisle; of Messrs. M. Saunders & Sons, Friar's Walk Nurseries, Cork; of Messrs. Wood & Ingram, The Nurseries, Huntingdon; of Messrs. Francis & Arthur Dickson & Sons, The Upton Nurseries, Chester; of Messrs. James Dickson & Sons, Newton Nurseries, Chester; of Messrs. Dicksons & Co., of Edinburgh; and of Messrs. Thomas Kennedy & Co., Dumfries.

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WE commend these interesting lists to all proprietors of estates and others, because they will show how much planting can be done for a comparatively small outlay. Looking, for instance, at the list of Messrs. William Fell and Co., of Hexham, we note that, in the part of the catalogue devoted to 'Seedling and Transplanted Forest Trees,' one year seedling Ashes can be had for 3s. 6d. per 1,000, Beeches for 4s. 6d., Birches for 5s., Elms for 7s. 6d., Scotch Firs for 2s., Larches for 2s. 6d., Oaks for 7s. 6d., *Pinus austriaca* for 2s., Sycamores for 4s. 6d., and Thorns for 5s. per 1,000. It puzzles us to know how plants can be produced with a profit at such low prices, but the fact ought to largely stimulate the tree trade, and induce extensive plantings. Let landed proprietors and other tree planters send for lists and see for themselves.

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A CORRESPONDENT, an artist, is anxious for information as to the existence and whereabouts of Spruce Fir woods within a hundred miles of Liverpool. If any of our correspondents can give the required information we shall be glad. Our artist has been painting the glories of the Beech, the Birch, and the Scotch Fir, but he is especially desirous of ascertaining the whereabouts of 'a good picturesquely-placed Spruce Fir wood, not more than a hundred miles from Liverpool.' He says: 'It seems to me that there is scarcely any colour in nature in such a gloriously rich mellow key of subdued gold as that in a Spruce Fir wood. There seems an undertone of bronze or copper running right through everything (seen in the interior of the wood), yet with continual variation both of the hue and the tone, and, over this, the variety and the gradation of the low, dusky, green-grey tones produce a harmony that is a continual delight to me even to think of, for it is two years since I saw more than a few of these trees together.'

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MR. JOHN WOOD, of Penistone, has sent us a little box containing some decided novelties in the shape of Christmas and New Year's Cards. They consist of cards with different-coloured grounds, on which are gummed actual plants—ferns, mosses, ivy heather, &c., and very prettily grouped. Each card, with its green and elegant freight, is pasted on to a threefold wrapper, which encloses it secure against injury. With the growing love of plants—the real things—there should spring up a large demand for these pretty cards, and we trust Mr. Wood will have his reward in the substantial success of an excellent experiment. The only thing that we fear is, should the desire for these plant cards become a 'rage,' very serious and destructive raids might be made upon the smaller and rarer species of plants which are chiefly required for purposes of this kind. Still, we trust that the fern collectors who may ply this new trade to cater for the requirements of the public will observe moderation, or otherwise many plants might be exterminated.

LEAF CANOPY AND PRUNING.

II.

THE ninth point of those enumerated, in which leaf-canopy with complete shade offered valuable advantages, was, that there is under shade less necessity for artificial pruning, and that the shafts of the trees grow straight. Many coverts may be seen which, having always been kept in close order, under the most favourable conditions of leaf-canopy and shade, show perfectly straight, sound, and branchless boles to a height of between fifty and seventy feet and even more. Such triumphs of forestry in taking advantage of and directing the processes of nature, without the interference of artificial pruning, are in this country less frequently to be met with. In the treatment of hardwoods, such results have generally been attained by the use of fostering nurses of Beech or Hornbeam. Both among broad-leaved and needled woods, if close order be produced and a complete cover overshading the ground and the lower parts of the young trees, the lower branches will early commence to drop off of themselves. These lower branches die, because they do not receive enough light to keep their foliage green ; and this extinction of all the branches below the leafy tops or crowns of the trees continues as they grow higher and higher. Under very favourable circumstances, where complete canopy has always been maintained, the branches withering below the spread of the crowns will never have attained any great thickness, and, soon after they have dropped, the traces of their existence will be completely effaced from the trunks ; thus the higher the bushy tops composing the canopy come to be from the ground, the greater length will be below them of clean boles; and this without any expense or labour of pruning. It is very doubtful whether any amount of artificial pruning, in open coverts, can ensure straightness of shaft, and correct the frequent appearance of accidental forking or crookedness. Among trees in close order, on the other hand, nearly all individuals shoot up naturally with straight single stems.

Having now seen that there are at least nine good reasons why the trees in a wood should be kept close together, it follows that open coverts, such as have to rely on artificial pruning for a desirable formation of tree, must have many disadvantages, and must be in many ways dangerous. There seems to be no valid reason why in every forest some coverts at least should not be maintained in close order, and all reasonably close, if only to guard against the possibility of there being more trees standing in need of pruning than can possibly be overtaken. It is not desired to dogmatise, nor to undervalue careful and skilful pruning in moderately open coverts. Any one electing to follow the latter system has in England two things much in his favour—the favourable humid climate and the higher prices of wood. The one will supply sufficient moisture to the soil even in most summers, and the high price of the scarce commodity may render it easier to bear the expense of artificial pruning. There is, perhaps, even a third circumstance in his favour—that the English soil is in general richer, and may in some cases hold out longer under neglect. It would hardly be profitable to discuss the question, whether either natural or artificial pruning should be pursued to the entire exclusion of the other. The question here selected for discussion in a moderate manner is, rather, which of the two methods should for the most part be aimed at? On impartial examination the preponderance of advantages will, it is thought, be found to belong to natural pruning by means of close order and the shade of leaf-canopy. It has, therefore, been sought to give prominence to the advantages of thorough shade, so apt to be forgotten and neglected in our favourable climate.

There is, however, something more to be said on behalf of artificial pruning. There are some circumstances in force at the present time which render it less easy to maintain a thoroughly satisfactory canopy among hardwoods, or to depend entirely on thorough shade in cultivating them. These are connected principally with the facts that the most valuable kinds of hardwoods are somewhat defective in their foliage, and that there are difficulties in the way of contriving admixtures with them of denser foliage to correct this. The Oak and the Ash, for instance, provide very light foliage, and, refusing to flourish in very close order, they cannot of themselves without admixture produce thorough and efficacious shade. The best specimens of Oak and Ash have been raised often in admixtures where there was a great preponderance either of the Beech or the Hornbeam. The present difficulty in continuing these, from a cultural point of view, highly satisfactory combinations, with their good effects in promoting and conserving the fertility of the ground, is that there is little demand for Beech or Hornbeam timber. Oak timber must certainly be had somehow, and before finding among broad-leaved or needled trees efficient substitutes for the Beech, and in the absence of universally approved admixtures, the forester has a strong inducement to make further attempts at raising Oaks unmixed. For these coverts of unmixed Oak it is not unlikely that he will be forced to call in the aid of artificial pruning, especially to improve the more promising trees. Where the Oaks are closest, he may sometimes be able to confine pruning operations for the most part to the removal of dry withered branches; but where they are more open, he will probably also apply the saw to green branches in order to secure a more desirable form and greater length of clean bole. He may also have to clean the boles periodically with a billhook of the small epicormic shoots which break out on them in the light and have a tendency to dry up the crowns. Pruning with due care demands time and labour, and it is therefore costly. It will not be expedient to slash a two-inch branch off a promising oak with an axe or a billhook.

The most expeditious pruning, consistent with prudence for the larger branches, may perhaps be effected with a narrow saw blade (less than an inch in breadth), stretched tightly, after the manner of a bowstring, across a curved or open wooden frame. The same kind of saw, to cut with the upward stroke, attached to the end of a fifteen-foot pole, will also be useful. In using the saw to cut off a branch at once close to the bole, the first cut should be made on the underside of the branch, completing the sawing from above or from the side. Thus, when the branch falls to the ground, it will not tear away any bark from the trunk, nor leave a fissure for the lodgment of wet and the commencement of rot. The wounds made by a fine small-toothed saw will, with ordinary precaution, be sufficiently smooth, especially if they receive a coat of tar in early winter as soon as it will adhere.

The attempt to raise unmixed Oak with pruning in this way will certainly continue to be made; and on good sites a fair measure of success may be met with. Nevertheless, there seems to be no sufficient reason why something more should not be done towards conserving the properties and condition of the soil. To this end the expedient already referred to, of planting soil-sheltering wood, is well adapted. After the Oaks have attained a good height and commence to be carpeted with grass and infested with weeds, plants should be set in the lighter spaces and gaps, chiefly of such kinds of wood as can subsist in the twilight shade of a grove. Shade-enduring kinds are Beech, Hornbeam, Silver Fir, and Spruce Fir, and of forest shrubs Holly, Juniper, and perhaps Elder may also be of some use as stop-gaps.

In rearing those needle woods which, being defective in foliage, do not form a thoroughly umbrageous canopy, the same expedient of underplanting may be employed with advantage both to the soil and also in consequence to their own continued growth. Of all of them the Larch is the most deficient in shading power, and has the greatest need of this assistance. The Scots Pine, too, though oftener satisfying the requirements of complete shade, will, not unfrequently, in an advanced stage, leave many gaps in its canopy. Here also the growth of the covert and the suitable conditions of the soil may be enhanced by underplanting.

A history of the origin and practice of the underplanting of Scot's Pine was some months ago given by Forstmeister Schott von Schottenstein, in the *Forst und Jagd Journal.* He refers chiefly to forest lands on the lower diluvial sand of the River Maine, under his own supervision, and belonging to the city of Frankfort. This forest was formerly composed entirely of broad-leaved trees; but after a decrease in moisture of soil, consequent on drainage works in the valley, these were compelled more and more to give place to conifers. Especially where the subsoil consists of a stratum of gravel, the common Pine shows a tendency to take open order. Where the taproot encounters the hard layer of gravel, many Pines die off and leave gaps. Some of these gaps being at first fortuitously sown by birds bringing seeds from adjoining leafwood, the idea was naturally suggested of completing the process by planting shade-enduring wood under the Pines. At the same time, the axe was used to remove some of the overwood in the interest of the undergrowth. By this means a more regular distribution of the permanent Pine covert was secured, and its yearly increase provided for by a thick ground cover and a plentiful fall of Beech leaves. In another part of the same district, Beech-nuts had also been sown under Pines, in the pole stage, with the view of conversion into Beech covert. This had been done over forty years ago. The very favourable influence of the thick Beech undercover on the growth of the Pine trunks occasioned a stoppage of the process of conversion, and a further diminution of the Pines was forbidden. At the same time, these conditions were initiated by sowing Beech-nuts in several pole coverts of Pine, between forty and fifty years of age, which had previously been rather severely thinned. The further gradual lighting of these Pines by thinnings was reckoned on till there should be left only 200 trees per English acre to produce heavy timber at a hundred and twenty years, when their crowns would scarcely close over the Beech covert underneath. The time for underplanting with Beech is determined by the time when the Pine covert, by repeated thinnings, is so far prepared that one more severe thinning will yield between 500 and 800 cubic feet per English acre, inclusive of branchwood and spray, and afford room for the Beech to thrive underneath. According to the experience of the district, this may happen when there are about 670 trees per English acre in the Pine covert, at about the fiftieth year of its age. The last important case of windfall caused by the hurricane of the year 1876, besides affecting the older coverts, let the daylight very much into some pole coverts of Pine under forty years of age, and left them in such a plight that some measure of amelioration was demanded. The following year, 1877, was a rich seed year for the

Beech, and opportunity was thus afforded for extensive experiments with undergrowth by sowing Beech-nuts. Many compartments of thirty-five to forty year Pines, which had been severely handled by the wind, were submitted to this treatment. After removal of the windfalls, the degrees of closeness in the covert were decidedly irregular. By gradual thinnings, following upon the undersowing, this irregularity was corrected, and eventually excellent results have been obtained. With regard to these after-lightings, it may be given as a rule, that they should be carried out gradually by means of repeated thinnings at intervals of between three and five years, reaching such a degree that within twenty years after undersowing the distribution of the remaining trees, about 200 per English acre, will admit of their permanence till maturity—perhaps in their 120th year. The yield of ordinary clearings of the Pine coverts in this district, at 120 years, of age, on sandy soils of the third-rate quality, varies between five and six thousand cubic feet per English acre, and the percentage fetching good timber prices, unless railway sleepers are wanted fluctuates between 35 and 40 per cent. of the solid contents. Thinnings may be reckoned to add about 33 per cent., raising the total bulk yielded to about seven thousand cubic feet, giving an average yearly growth of about 58 cubic feet per English acre for the whole period of 120 years. How great will be the yield at maturity in the open Pine coverts with underplanting cannot yet be established by actual returns of fellings ; but there is good reason for calculating that, including thinnings, they will represent an average yearly growth of 100 cubic feet per English acre during 120 years, or nearly double that of the other coverts. The increase in the girth of the Pines is especially remarkable If, besides, the returns from the under-covert be added, it will be evident that the underplanted coverts represent a considerably higher value than the others. According to the accounts of cultural expenses, the average outlay for undersowing the Beech-nuts was about 10s. 3d. per English acre. Many instructive details have had to be omitted ; but the above particulars may possibly convey some idea of this rather new contrivance.

Some such method of underplanting or undersowing might be advantageous for raising coverts which are to depend on artificial pruning, and for conserving the soil under those kinds of wood which are very necessitous of light, such as the Larch, Ash, and Oak.

In the *Field*, of the 17th November, a lamentable account is given of the decadence of the Oak, Ash, Spruce, and Larch in South Yorkshire, in the smoky district of Sheffield and Barnsley. It is matter of legitimate curiosity whether a thick undersowing or underplanting with Beech or some shade-enduring wood might not revive some of the drooping Oaks, Ashes, and Larches, and give them vigour to make a better resistance to the baneful effects of the smoke. The hopes of maintaining green cover in South Yorkshire in the future seem to be directed chiefly towards the Sycamore and Spanish Chestnut. The Sycamore, too, when it springs up to some height, would require to be underplanted with soil-sheltering wood. For, although isolated Sycamores are provided with good dense heads of large leaves, yet, growing together, they do not at an advanced stage sufficiently shade the ground.

Assuming the absence of any such precautionary underplanting, some objections or dangers may be mentioned as peculiarly attaching to open coverts with artificial pruning. The principal danger is that already referred to—the exposure of the soil, endangering its continued fertility, and entailing the loss of all those advantages enumerated at the beginning of this paper. Although it is true that, other advantages of site being equal, each tree in an open covert may make wood rather faster than each tree in a close covert, yet too much of this wood is put on in the branches, whence the necessity for artificial pruning. The shafts of trees in an open covert, unless they can be corrected by pruning, taper very much; whereas in close order, the crowns and all the leaf power being set high in the canopy, the shafts are proportionally thicker in their upper parts, and do not diminish so rapidly in girth. In open coverts, too, the shafts occasionally take a crooked form, since malformations due to frosts or other accidents in early youth are not corrected by the nursing or competition of near neighbours. It is doubtful whether artificial pruning can entirely eradicate crookedness of shaft. Open coverts also show a good many cases of another defect—the forking of the shaft. Artificial pruning can of course remove the competing leaders, giving the tree one single axis or shaft; but the resulting crookedness cannot so easily be corrected. Again, if each tree in an open covert is liable to require pruning, it is not unlikely that, where there are many and extensive open coverts, there will be many more trees in need of treatment than can possibly be attended to, without detriment to other necessary forest operations. The difficulty is not lessened by the consideration that each tree pruned will probably require periodical pruning several times repeated during its life. This difficulty of the application of labour, with the allied question of expense, seems almost prohibitive of the multiplication of open coverts in a large forest, or the employment of artificial pruning on a very extensive scale. In France for a time great stress was laid on pruning, but it is said that the results were not altogether encouraging. Pruning may perhaps be more feasible in the woods around the residence of a wealthy proprietor, where labour may be available to devote to this purpose; such woods will often be favoured in various ways which could not be adopted as precedents in large forests depending entirely on their own resources. A forest, if it is to have an independent existence, and pay all expenses out of its own yield, must be large, and economically worked. Even if pruning can be beneficially employed in the woods on a residential estate, it does not follow that artificial pruning can be considered as more than a remedial and rather exceptional operation in economic forestry. The usefulness of pruning for standards among coppice is evident, and it can scarcely be denied that it might often be a valuable remedial measure even in high wood forest, if it could be afforded. However desirable and useful it might be even in close coverts, yet in operations on a large scale it has often to be omitted as a too expensive luxury.

The question of expense will probably have the greatest force in determining whether the forester shall extensively apply artificial pruning. In investigating the deterrent or limiting effect of expense on the extensive application of artificial pruning, some preliminary inquiries are necessary. The first or general preliminary inquiry has some connection with political economy, and seeks to fix the number of labouring men or families who can be supported by the yield of a given area of forest. The answer to this question will indicate the greatest possible amount of labour which could be continuously bestowed on the forest, and it may be safely estimated at a very small proportion of that amount of labour which may be remuneratively employed on the same acreage of farm land. The inquiry may be put in a more practical shape for our purpose. Having ascertained the average yearly yield of a given area—say, two thousand acres of forest, deduct from it appropriate maintenance for a forester and assistant-forester and the proprietor's share of the profits. The proprietor's share of the profits ought to be at least about 3 per cent. on the total capital of the forest; that is, about 3 per cent. on the sum of the three forms of capital—the ground, the growing timber, and the money provided for working expenses, or sunk in working-plant. The simple question then remains, How many labourers can be employed to earn the remainder of the average annual yield? Or how many days' wages are available for the employment of labour in the forest? The next inquiry will be—Of these, how many days' wages can be devoted to pruning?

If these inquiries were to be carefully worked out and answered, some guide would be supplied as to the limits of artificial pruning. It would probably appear that the forest can afford to prune only a comparatively small number of selected trees. The forester would, in that case, do well to restrict pruning for the most part to promising Oaks and urgent cases. This is, however, prejudging the question.

This prejudice against much pruning will be strengthened by its apparent resemblance to the methods rather of gardening than forestry. It recognises each individual tree, and bestows attention on each separately. Now the characteristic methods of sylviculture are in general of wider and more comprehensive scope—not attempting to deal with each tree in detail, but dealing with no smaller unit than a covert or forest compartment, that is to say, a mass of trees covering several acres, and tolerably homogeneous in age, height, distribution, and other respects. Thus the small proportion of manual labour which the forest can as yet afford to utilise is made to produce the maximum of effect. The day may come when the increased value of wood will permit of more labour being applied to its production, and then, doubtless, pruning will gladly be more and more resorted to, and its extensive application, with due care, skill, and moderation, will give valuable assistance. At present, as before remarked, it is only a large forest which can have an independent and self-supporting existence, and to judge of the appropriateness and efficiency of a method of treatment it is necessary to see it in operation on a large scale.

Can it then be assumed, without misgiving, that the forest can at present afford so intense an application of labour and outlay as is involved in a routine of artificial pruning in open coverts; and that open coverts will not deteriorate the soil?

N. N.

BEAUTIES OF BRITISH TREES.

TWO mistakes, to which reference is made elsewhere, were made in the illustration of my article on Poplars in last month's 'FORESTRY,' viz., the first woodcut, named 'Poplars,' represented a group of Lombardy Poplars; and the second, named 'Lombardy Poplars,' was inserted by inadvetence.

THE ROSE.—Once more we seize the opportunity of attempting the praises of a group of plants that have but small claim to rank among forest trees; for who is not glad to express his love for Roses? Does not the very name borne by this chiefest of flowers in almost every language of Europe, ancient and modern, make one feel poetical? The temperate regions of our northern hemisphere may fairly challenge the luxuriance of the tropics or the weird flora of Australia to rival the Rose. In this group Nature, lavish of beauty, seems to defy the efforts of the systematic naturalist. One botanist, Don, describes 202, another, Loudon, but 77 species of Rose, whilst Sir Joseph Hooker only recognises the existence of about thirty, which, are really distinct. These are, however, practically endless in the variety that a careful observation of wild forms and the cultivation of hybrids and seedlings afford, so that Linnæus himself expressed the opinion that in this group Nature herself had prescribed no certain limits to the species, and, while hundreds of new garden forms are described annually, French gardeners, more than thirty years ago, boasted of 2,500 named varieties. Having its southern limit in India, Abyssinia and Mexico, and represented by but few species in the New World, the home of some of the most beautiful species and of the chief culture of the Rose is in Asia; but in England, whilst we have forms which some botanists range under twelve, or under upwards of thirty species, there are no less than five perfectly distinct groups of Wild Roses recognised by every writer on the subject. We are not now properly concerned with the charms of the Cabbage Rose of Provence (*Rosa centifolia*), probably a native of Western Asia; of the sweet-scented Damask Rose (*damascena*), which Europe owes probably to the Crusades, and England to Henry VIII.'s physician, Dr. Linacre, the founder of the Royal College of Physicians; of the Musk Rose (*R. moschata*), that we owe to Thomas Cromwell; or of Lady Bank's Rose (*R banksiæ*), with its numerous pendulous, creamy clusters, or of the other natives of China (*R. indica* and *R. semperflorens*); for we may truly say with old John Gerard, 'The Rose doth deserve the cheefest and most principall place among all flowers whatsoever, being not onely esteemed for his beautie, vertues, and his fragrant and odoriferous smell, but also because it is the honore and ornament of our English Scepter.'

The archæology and symbolism of the Rose would fill a volume. I can here only allude to the love that the ancient Romans had for this flower, crowning themselves and their wine-jars in their banquets with Rose-garlands, and, as Mr. Alma-Tadema's pictures remind us, strewing the petals on the water in their baths. Owing, it is said, to a legend that Cupid bribed Harpocrates to silence by the present of a Rose, it was a Roman custom to hang a Rose over the banqueting table as a symbol that, though '*in vino veritas*,' things there heard were not to be repeated: hence the expression, *sub rosa*. The Rose of Sharon, in the Song of Solomon, has always been taken as symbolical of the Catholic Church, whence probably arose the custom of the Pope sending consecrated golden roses to the various Christian princes. England has too good cause to remember the 'faction in the Temple Garden,' that sent—

> 'Between the Red Rose and the White,
> A thousand souls to death and deadly night,'

and it was probably mainly after the fusion of the rival houses of York and Lancaster in the Tudor line that the Rose became so favourite an architectural decoration. Long before this, however, the Rose was the emblem flower of England, whose pale-blossomed hedgerow briars covered with summer Roses are even mentioned by Pliny. The presentation of a Rose, sometimes, however, at the season of Christmas, when they were not easily procurable, seems to have been a common feudal form of honorary rent or 'petit serjeanty,' and Queen Elizabeth compelled that unfortunate 'proud prelate,' Bishop Coxe, to let his palace at Ely Place to her favourite Lord Chancellor, Sir Christopher Hatton, at the annual rental of ten pounds, ten loads of hay, and a Red Rose. The Bishops of Ely, however, reserved to themselves the right to gather twenty bushels of roses yearly in the gardens—a crop which it would be difficult to raise in Hatton Garden at present.

The beautiful blossoms, sometimes pure white and sometimes deep red, sweetly scented, surrounded by thorns and falling directly their petals are fully expanded, have naturally been fruitful of allegory: purity and atoning blood, innocence surrounded by sin, the sweets of life only to be obtained with its troubles, and the short-lived character of all these delights, are the lessons which moralists, divines, and poets, pagan as well as Christian, have drawn from the Rose. Thus, in the *Lady of the Lake* we have the sadder aspect, when the poet says:—

'The rose is fairest when 'tis budding new,
And hope is brightest when it dawns from fears.
The rose is sweetest washed with morning dew,
And love is loveliest when embalmed in tears.'

Whilst Herrick urges the same idea more cheerfully when he writes:—

'Gather ye roses while ye may,
Old time is still a-flying;
And the same flower that smiles to-day,
To-morrow will be dying.'

Perhaps, however, the prettiest of all the connections between roses and innocence is the following quaint legend of the origin of the flower, told by that unrivalled Mediæval *raconteur*, Sir John Mandeville, in his Travels which were written in English in 1356:— 'At Bethelcim is the Felde Floridus, that is to seyne, the Felde florisched; for als moche as a fayre mayden was blamed with wrong and slaundered, for whiche cause sche was demed to the Dethe, and to be brent in that place to the whiche she was ladd; and as the Fyre began to bren aboute hire, sche made hire preyeres to oure Lord, that als wissely as sche was not gylty of that Synne, that He wolde helpe hire and make it to be knowen to alle men, of His mercyfulle grace. And when sche hadde thus seyd, sche entered into the Fuyr; and anon was the Fuyr quenched andoute; and the Brondes that weren brennynge becomen red Roseres, and the Brondes that weren not kyndled becomen white Roseres, full of Roses. And these weren the first Roseres and Roses, both white and rede, that evere ony man saughe.'

The moral of this pretty story is at least less doubtful than that of such legends as that of St. Rose of Lima.

Mediæval writers were not so wholly given up to tracing mystic significances, however, as to be incapable of minute observation. In our single wild Roses there are five 'sepals' or leaves to the calyx—the green leaves beneath the petals, and of these two are 'pinnate,' or cut on both sides, two not at all, and the fifth on one side only. This was expressed in the old Latin enigma—

'Quinque sumus fratres, unus barbatus et alter,
Imberbesque duo, semibarbatus ego,'

which elegiac couplet has been rendered—

'Five brothers take their stand,
Born to the same command:
Two darkly bearded frown,
Two without beards are known;
And one sustains with equal pride
His odd appendage on one side.'

It is unnecessary to describe the shrub itself in any detail. Either erect or climbing, the Rose generally produces long branches, which bend in graceful curves, and trail along the tops of hedgerows and thickets, hooking themselves up by their prickles, so that, though the stems be weak and slender, the young leaves and flowers may be well exposed to light and air. This is the *raison d'être* of prickles. Several exotic species of Rose are, however, thornless, whilst many forms are also furnished with glandular hairs.

The leaves, though they vary considerably in size, colour, texture, and the number of their leaflets, are always remarkable for beauty of outline. The delicately serrated margins of the roundish but pointed segments, and the peculiar pair of 'stipules,' or leafy appendages, at the base of the leaf-stalk to which they are 'adnate' or united, contribute to this beauty; but it is undoubtedly of the forms, colours, and perfumes of the flowers that we think first when we sing the praises of the Rose.

It is one of a very limited number of flowers which an artist, who is not also a gardener, will admit to be capable of equal beauty when either single or double. Our wild British species are generally single, having usually but five petals; but Gerard records the White Rose (*R. arvensis*) as double in Lancashire; and Herodotus records, perhaps truthfully, the occurrence of Roses with sixty petals—probably the Cabbage Rose (*R. centifolia*)—in Macedonia. The indescribable curvature and grace of outline of each individual petal is common to both single and double forms; but in the former the exquisitely delicate whites, pinks, yellows, and flame-colours of the petals contrast with the dark brown or clear golden yellow of the stamens. Perhaps, on the other hand, it is chiefly in double Roses that we have the beautiful rolling back of the edges of the petals; and in these the chaste simplicity of the spreading cup is replaced by new beauties of form arising from the charmingly disorderly order, or *abandon*, of the crowded petals. It is such lovely Roses as 'Devoniensis' or 'Niphetos' that best illustrate my meaning. The velvety texture of the juicy petals enhances the beauty of the clearness and purity of their colouring. A violet Rose would jar upon one as incongruous; the dead white of our Hedge Rose (*R. arvensis*), the blushing flowers of the Sweet Briar (*R. rubiginosa*), the flaming Austrian Briars (*R. punicea*), and the whole gamut of colouring in our garden Roses, to 'Gloire de Dijon' in one direction, and to 'Charles Lefebre' in another, all strike one as pure, free from that muddiness which imparts a certain coarseness to every Dahlia and to most Chrysanthemums. That this grace is largely due to texture is perhaps evidenced by the fact that, outside the Rose group, it strikes us most in the Clematis. The rapid fall of the petals of the full-blown Rose after it is, plucked, is unfortunately, proverbial; but we must set against this the endurance of their varied perfumes after they have fallen. Science has not yet furnished us with any scale of odours that will enable us even roughly to characterise the many scents of our Roses. Some are scentless, but none are unpleasing in smell.

Whilst acknowledging the pre-eminent charm of the flower, we must also record the great beauty in many Roses of the fruit, the famaliar 'hip' of our boyhood. In structure this fruit, which botanists term a 'cynarrhodum,' is exceptional. Within a fleshy, polished and gaily-coloured urn, or 'receptacular tube,' crowned above by the shrivelled remnants of the calyx and the stamens, which, with the now-fallen petals, once rose from its rim, are the small hard fruitlets, or 'achenes,' often coated with downy hair, and each containing a single seed, so that one hip may include as many as twenty. In colour these hips—at first bright green—range in autumn from clear yellow, through every shade of scarlet and crimson, to black; and they also vary greatly and beautifully in form and in size, some being perfectly spherical, and as large as a medlar.

The large blossoms of the double Roses, rich as they are in colour and perfume, have too great an air of cultivation to be in place beyond the limits of the garden proper; and, concerned as we are with British trees mainly in relation to the shrubbery, park, and woodland, we will, therefore, speak only of the Briars, or single Roses. Of these, as before stated, we have in England five distinct groups, often termed species; viz.: the Scotch or Burnet Roses (*R. spinosissima*), the Downy Roses (*R. villosa*), the Sweet Briar (*R. rubiginosa*) the Dog Roses (*R. canina*), and the Hedge Roses (*R. arvensis*).

The Burnet Roses are low-growing, erect, and bushy shrubs, their stems crowded with straight prickles of very unequal length, with stiff bristles and with glandular hairs, and their leaves small, but made up of as many as seven or nine leaflets. From May to August they produce their flowers, which are generally solitary, but sometimes two or three together, from an inch to an inch and a half across; generally white, but sometimes pale pink; and with their styles short, and not united. In September and October they ripen their pink, red, purple, or black hips, which are short and roundish, and have generally sepals distinctly persistent. In dry or exposed northern situations they may make effective bushes, three or four feet high, in a park or wild garden.

The Downy Roses form larger bushes, with arching branches sometimes from six to ten feet in length, having but few prickles scattered over their surface, and these mostly slender, straight, and of uniform length. Their leaves generally consist of five or seven leaflets, which are very downy; their flowers are solitary, or in twos or threes opening in June and July; and their bright red fruits, ripening between July and September, are globose, and generally densely covered with bristles and glandular hairs, the persistent sepals that crown them being also glandular. The members of this group, which are chiefly wild in our northern counties, have but little distinctive beauty, but may well be mixed with other tall-growing briars in those tangled clumps of Hawthorn, Clematis, Woodbine, Briar and Bryony, that form the chief beauties of many a 'rough bit' of common land or park.

The Sweet Briars form small, sub-erect bushes, sometimes very compact in growth, but sometimes sending out long arching branches, and always distinguished by the leaves, which are almost hairless, but densely covered with glands on their lower surfaces, from which, in the various forms, more or less of the characteristic perfume is given off. Their stems bear scattered hooked prickles, with bristles and glandular hairs, and the delicate pink flowers, opening between May and August, are succeeded in September and October by smooth red fruits that vary considerably in shape. These plants mostly rejoice in a limestone soil; and the sweet-scented ones, giving off their perfume freely under the influence of summer sunshine, should be planted in open spaces. The most fragrant form has the most compact habit and the most deeply coloured blossoms; but the less fragrant ones (*R. micrantha* and *R. sepium*) are well worthy of a place in the tangled clumps before alluded to, for the sake of their trails of pink flowers. Very variable are the Dog Roses. They are the largest and loosest in habit of our British Roses, and may in general be distinguished by their scattered, strong hooked prickles, their leaves and flower-stalks without glands or hairs, and their distinct styles. The leaves are, however, occasionally hairy on their lower surfaces, and may even have a few glands on the veins, and vary considerably in the number, size, and serration of their leaflets. The flowers open in May or June, and are generally tinged with pink; but they differ much in the number in each cluster, and they are scentless. It is hardly worth while for the practical planter to risk the loss of his patience, if not of his reason, in the attempt to discriminate the botanical characters of the thirty or so named varieties of the species. Let him take seedlings, or suckers, of some free-growing kind, with long trailing branches and thickly clustered blushing blossoms, and, whatever its name, it will be, in the tangled clump, 'a thing of beauty and a joy for ever.'

'What is it? A learned man
  Would give it a clumsy name:
Let him name it who can,
  The beauty is still the same.'

The Hedge Roses (*R. arvensis*) are mostly large bushes, with trailing or arching branches often deeply tinged with a rich maroon-purple tint, with strong hooked prickles, smooth leaves and clustered white flowers, having their styles united into a protruding column. They are often low-growing trailing plants, but the dead white of their petals forms a charming contrast to their purple stems and yellow stamens, or to the pink and gold blossoms and bright green bark of the Sweet Briar or of many Dog Roses. With these wild briars may well be planted such Roses as *R. bracteata*, the large single white Macartney Rose from China; *R. Lyelli*, also white, but generally double, from the Himalayas; *R. puniced*, the lovely Austrian briar; *R. pyrepaica* and *R. rugona.*

This is not the place to dilate on the manufacture of the princely Ottar, or Otto, of Roses, the essential oil distilled from the rose-water obtained from the petals mainly of *R. oentifolia* grown chiefly in Kashmir, at Damascas and in Rumelia, one drachm of which is said to require five-hundredweight of rose-leaves, and the production of which, in Rumelia alone, yields an annual revenue exceeding £70,000. In our land the summer sun has not heat enough to ripen the petals so as to form the oil; but perhaps rose-farming might be successful from a purely mercenary standpoint in 'the sunny south' of Australia. More we must not add of the Rose—

> 'Considering that no flower is so perfite,
> So full of virtue, pleasannce, and delight,
> So full of blisful angelic beauty,
> Imperial birth, honour, and dignity.'

G. S. BOULGER.

WOOD IN SURGERY.—Wood is being employed scientifically in surgery in a different form from ordinary splints, says the *Chicago Lumberman.* A foreigner has introduced wood-wool as a cheap and useful dressing for wounds, and it is being prepared extensively as a commercial staple for surgical dressings. It is finely-ground wood, such as is extensively used in the manufacture of paper. It is a clean-looking, delicate-fibred, soft, yellowish-white substance, having an odour of freshwood, and absorbs an immense quantity of liquid. The best wood-wool was found to be that which was obtained from the *Pinus picea.* The wood-wool thus procured was first pressed, passed through a sieve, then dried and impregnated with a solution containing ½ per cent. of sublimate and 10 per cent. of glycerine. The advantages claimed for this dressing are numerous. It is cleanly, fresh, and of a whitish colour; it is at the same time soft and delicate in texture as cotton, and "extraordinarily cheap." The actual price is, however, not stated. It possesses some antiseptic properties naturally, has an agreeable odour, and is exceedingly elastic even in thin layers, so that bandages can be put on more lightly with this than with any other dressing. Its absorbent properties are so high that it takes up twelve times its own weight of water, so that 10 ounces of well-dried wood-wool, after complete saturation, attain a weight of 130 ounces.

OUR SONGBIRDS.

The Robin.—We do not place him first because he is the best singer, but because he is the greatest favourite. There is no bird that sticks so close to foresters as the Robin; in winter especially he is their constant attendant. It matters not to what lonely part of the forest they may go, he is sure to turn up; indeed it is quite a common thing, before the men get off their coats to begin work, to see him perched on a spade or mattock handle. When he thus presents himself he looks as if he expected something; but there is nothing of the 'please to help' about him, but an air of perfect intimacy, and that he will be attended to as a matter of course. This mute appeal is never in vain, for, over and above the grub which he finds in the upturned soil, some one in the squad is sure to open his bag and throw him some bread. His fighting instincts are well known, and if another redbreast appears on the scene, war begins at once, the point at issue being who is to claim that piece of ground for the day. The robin fights with the whole race of small birds, and finds his match only in the house-sparrow. It is a sight to see the two quarrelling over a crumb, the robin, with bent head and flashing eye, meaning to fight it fairly out; but the sparrow is too much for him; for, watching his opportunity, he sidles up to the morsel as only a sparrow can, and in a moment is off with it, leaving poor Cock Robin to moralise over the degenerate times.

The Robin sings more or less throughout the whole year: in spring he is foremost among the tuneful choir; in autumn you may see him perched in a tree, amidst a shower of falling leaves, singing out his ditty bright and cheerful; at intervals also throughout the winter they may be heard answering to each other. The song of the Robin is very characteristic, being round, clear, and penetrating.

The Blackbird.—We have no hesitation in placing *Blackie* at the 'top of the tree' as our best singing bird; for variety, richness, combined with a sort of pawky humour, his song is unrivalled. When listening to him, you have the idea that he is tantalizing you: his opening notes seem to begin a flowing melody; but before he has gone far he suddenly stops, with a suppressed chuckle which sounds at times very like a snigger. The Blackbird rarely repeats himself, but generally has a new theme in all his solos; consequently you never tire of his music, but are always wondering what is coming next. When his nest is harried, he utters a piercing wail of grief, quite different from any of his other notes. Unlike some other birds, Blackie remains with us all the winter, and gets a share of what is going; for one of the first sounds we hear in the morning after a snowstorm is his plaintive 'chook' appealing to our charity.

The Thrush, or Mavis, comes next. His singing differs from the Blackbird's, being bold and clear. When he gets hold of a good phrase, he repeats it five or six times. Amongst a great variety of notes, something like the following is frequently heard :—'Chilly-oo, chilly-oo! Seek it oot, seek it oot!' and an unmistakable 'How-de-doo.' Sometimes he begins on a low key, and at a single bound rises to a third above the upper octave; at other times he sings in fifths, and slurs up the intervening notes with great precision. The Mavis is the first to begin in the morning, and the last to give in at night. Burns speaks of it as 'Thou Mellow mavis, that hails the nichtfa'.' During the severity of winter he migrates to the sea-coast.

The Chaffinch, or, as we call it here, the Shilfa, is a pretty little creature, and is the best singer amongst our smaller birds, although he has only one short tune, which he sings over and over again. Country people have interpreted this phrase as 'My pretty little maid, come here directly,' a peculiar twirl being given to the last note. The best place to hear those birds is in a glen filled with hollies, where they congregate in great numbers. Taking your stand on one of the banks, you will hear their music rippling backward and forward throughout the whole day, and far on into the night. The nest of the Shilfa is a marvel of neatness and warmth.

The Willow Warbler.—This little bird has a soft, liquid tone, and its singing very much resembles a trill of subdued laughter. Along with the Shilfas, they begin to sing an hour or so later than the Blackbirds and Thrushes, and, as they are found in great numbers, their singing is full and melodious. They build their nests on the ground, which in the bark-peeling season are very liable to be trampled on; foresters, however, are most careful in protecting them, and generally put up a branch to mark where they are. Like some other birds, they have a little trick they play off upon us. You will sometimes come on one fluttering on the ground, apparently at its last gasp; on stooping to lift it up, it will make a despairing effort to get out of the way, and lead you on and on until you are a safe distance from its nest, and then fly off.

The Green Linnet is also a good song bird. He is heard to best advantage at the end of the season, when the other birds have stopped. On a quiet summer evening you will hear him singing in slow, plaintive notes on some tree-top, as if mourning over the departed spring. Occasionally he will take a zigzag flight, jerking out his notes as he flies from tree to tree.

The Yellow-hammer, or Yorlin.—This bird is occasionally found on the outskirts of plantations, but it prefers the tangled hedgerows in the open country. Its song is very quaint, and has a dying fall about it; it seems to express the idea contained in the old Scotch words, 'a wedeaway.' The traveller, weary and footsore, far from any human habitation, hearing this plaintive strain coming from a brier-bush by the wayside, will feel that it is quite in keeping with his own feelings and the lonely situation. These half-dozen birds may be regarded as our principal singers, although there are many more in our woods, such as the Wren and Hedge-sparrow, who help to swell the general chorus by an occasional song.

In order to hear the birds at their best, you must get up, some morning in the first or second week of May, at two a.m.; for, although they can be heard at any time during the day, there is a volume and brightness about the singing which can only be heard in the early morning. When stepping into the woods at that time, the first thing that strikes you is the great stillness that reigns—a stillness not of death, but of repose. Perhaps you will hear far off in the fields the Corncrake rasping over his familiar tune: if there are any streams near by, the sound of their running waters will be mellowed, and will fall with a soothing effect upon the ear; but in the woods themselves not a sound is heard. This year I found the air laden with perfume from the Hawthorn, and a thin white mist floated over the fields. The bird that first begins to sing is either a Robin or a Mavis: this year it was a Robin, who sang two or three minutes all alone. It is remarkable, however, how quickly the other birds join in; from the time that the first note is heard, not fifteen minutes pass until the whole woods are ringing with song. After listening awhile, you discover that the Blackbirds do the greater part of the singing; there is no break or pause in it, it flows on one continuous stream, while that of the others is like so many rills running into it. While there is a most beautiful blending of all their notes, each bird can yet be heard distinctly. You can hear the Mavis pouring out his heart in clear ringing notes, sometimes in tones of authority like a drill-sergeant, at other times in snatches of beautiful melody, but at such a furious *tempo* that we can scarcely follow him.

The Robin is heard at short intervals, clearand distinct as a piccolo, in an orchestra. The Field-sparrow also interjects his quaint chatter along with the little Wren, who rattles off his crisp tune, all of which gives a pleasing birr and variety to the music. Here, then, when the world is asleep, the woods far and wide are resounding with a joyful outburst of song. At such a time and place there is nothing to distract the attention, so that you can drink in this unalloyed pleasure to your heart's content; for there is no doubt it is one of the purest and most heart-stirring experiences that one can enjoy. The singing goes on in full chorus until daylight is fairly in; the birds then drop off one by one, and are seen alighting in all directions for the early worm The Shilfas, Willow-warblers, and others then take up the singing, and with occasional help from the Blackbirds and Thrushes, carry it on throughout the day. When the twilight comes on, the birds once more join together and sing with great spirit, the Mavis generally being the last to stop. The birds begin in February, and sing on to the end of June; in some places it may be a little later, but by the second week of July it is quite over. It is singular indeed that in the full glory of summer when the trees seem to invite us to their cooling shade, this music should cease; but so it is, for the only indication you get of the presence of birds is seeing them flitting noiselessly about from tree to tree, and one experiences a feeling of sadness when walking through the woods, and instead of every tree and shrub being vocal with the music of birds, we find a strange silence reigning over all.

R. BAXTER.

THE HAWFINCH, OR GROSBEAK

EVEN Gilbert White went astray in his account of the Hawfinch, or Grosbeak, as he preferred to call it. It was 'rarely seen in England,' he said, 'and only in winter.' After finding such a man mistaken, the errors of new naturalists, who have imagined the bird to be a winter visitor only, need not surprise us. The fact is well established that the Hawfinch is not uncommon and that it is little known, and rarely seen, only on account of its extremely shy and retired habits. It breeds anywhere between the Tyne and the Tamar, a few counties only excepted, perhaps.

At Cobham, in Kent, a few miles from London, fifty nests have been observed. It has been seen in every county in England, except Westmoreland. In all the Home Counties it is plentiful; in Epping Forest particularly it abounds. Unlike some other shy birds, whose numbers have diminished since our modern agricultural improvements, the number of Hawfinches has become greater.

I know this bird quite well, from having resided in a Home County, where some years back I often endeavoured in vain to stalk the Hawfinch, perched on the top of a tree—a place of vantage from which it is in the habit of taking a sharp look-out; but the shy bird invariably flew off before I could get within shot. Mr. Doubleday, the best authority on this particular bird, remarked in a paper in the first volume of 'The Magazine of Zoology and Botany,' as long ago as in 1837, that the shyness of the Hawfinch exceeded that of almost any other land bird. He had watched the bird for years, and gave an excellent account of it in the journal before named. The late Professor Bell, when occupying Gilbert White's house at Selborne, saw two Hawfinches in a Douglas Fir-tree on the lawn, in the month of April, 1867, and he speaks of them as not being rare at that time in the Selborne district, though they certainly were so in the time of Gilbert White. Perhaps the planting of their favourite tree, the Hornbeam, may have drawn them to the neighbourhood. Mr. Aitchison, a naturalist of Northumberlandshire, writes, in a local paper, that the Hawfinch is a comparatively rare bird in the north of England; 'but,' he adds, 'it would seem to be more plentiful with us in winter than in summer, its numbers being probably augmented by a migration from the more northern parts of Europe at the commencement of winter; hence it is said to arrive here about the month of October, and to leave again about the middle of April. We are not aware that its nest has ever yet been met with in any part of Glendale; and the bird has only been a few times observed in our district.' Mr. Selby records his having seen a specimen of the Hawfinch at Alnwick Castle, which was shot near Hulm Abbey many years ago. A gentleman also obtained two specimens (a male and female) in Ellingham Wood, in the month of May, 1872. They had been ruthlessly destroyed at the commencement of the breeding season, for no other purpose whatever than the gratification of an idle curiosity; and thus the chance of a very interesting addition to the birds of the district was lost. Mr. J. Hancock is another witness to the occurrence of the Hawfinch both in Northumberland and Durham. A nest has not yet been reported, but it is not at all impossible. Mr. Aitchison thinks that the bird may sometimes nest in the more deeply wooded parts of either county.

It is common in Germany, Norway, Sweden, and Russia, and numerous in some parts of France. In Paris you may sometimes find it on sale, caged, in large numbers. Shy as it naturally is, it soon becomes familiar as a pet, and in captivity will use its long beak freely in self-defence.

As some persons may still be unfamiliar with this shy bird, I may describe it as resembling in form and figure a particularly stout Bullfinch. In colouring also when in full plumage, it is almost as distinct as the Bullfinch, with a beautiful big head, fawn-coloured feathers on the crown, nape of neck, and upper tail coverts, neck greyish, back chestnut brown, wings black, with the greater wing coverts dull white.

The colours of the female are less brilliant than those of the male, and the young of the year are much paler than the adults. As they advance in age, some reddish feathers appear irregularly about the lower part of the chest, and the upper parts deepen in colour, assuming a tarnished brown spotted with tints of dullish yellow. Young or old, the bird may be always known by its prodigious beak.

The length of the adult male is seven inches. It owns a somewhat short and stumpy tail.

Like other finches, the Hawfinch feeds in summer partly on insects and their larvæ.

Gilbert White's friend 'B.' opened the crop of a Hawfinch, which had haunted his garden for a fortnight, and which he thought must have stripped the fruit bushes of their buds. But instead of finding buds he discovered only kernels and fruit stones. He afterwards observed it cracking damson stones.

Among all the Finches he owns the biggest bill, the best adapted for berry-breaking, and hence his name of *Coccothraustes*.

First upon the list of the seeds and berries which the Grosbeak feeds upon, is that of the hornbeam ; and then follow the seeds of the beech, elm, ash, and maple, and the berries of the juniper, service-tree, holly, whitethorn, and hemp, besides the stones of various fruits, plum-stones and laurel berries ; and, scandal adds, green peas in the season, which if it be true, might be avoided in the case of a bird so shy. I have several times observed the Hawfinch in Richmond Park in close attendance upon the very noble specimens of the hornbeam which grow near Pembroke Lodge.

The pairing season commences in the middle of April. The nest is placed very frequently in some scrubby hawthorn, or among the spreading arms of great oaks, or in hollies or fir-trees standing in plantations. Its elevation from the ground varies from five to thirty feet, and I have seen the nest previous to the leafing of the hornbeam very much exposed for so shy a bird. It is a much more slovenly affair than would suit the tastes of finches in general, consisting of a structure too loosely put together to bear removal without tumbling into ruin, and composed, in some nests which I have noticed, of twigs of oak and honeysuckle mixed with grey lichen, and lined with fine roots and hair. Instead of being neat and round, like the nests of other Finches, it is a sort of cup-shaped platform, formed of comparatively coarse materials, and furnished with eggs of pale olive-green spotted with black, and from four to six in number. The young birds are hatched about the third week in May.

As a songster, the Hawfinch takes the rank of a second-rate performer only ; still he assists the variety of the bird-concert in spring, and on warm days occasionally warbles an acceptable ditty ; in winter, a kind of low whistling, with some admixture of tones that are rather harsh.

I hope these notes on the Hawfinch may prove interesting to some of the readers of 'FORESTRY,' and enable them to recognise this bird of woods and tree-tops, if they do not already know it.

H. E.

THE 'INDIAN FORESTER.'*

THIS number of the Indian Magazine of Forestry contains a number of very interesting articles. The first one is translated from M. Picton's 'Forest Organization,' and describes the actual administration and control of a private estate belonging to a French noble family, and consisting of several detached forests. These forests are described as situated in different parts of Luxemburg, Switzerland, and France, and amounting altogether to 75,000 acres—about equal to the average extent of a State Conservator's charge.

'Notes from Rewah' are concluded with remarks on the subject of lac, which is collected from two kinds of tree for the manufacture of shell-lac. Lac is deposited on the trees by an insect of the *Coccus* family, which feeds on them. The two trees on which the deposit is mostly found are the *Butea frondosa* and *Schleichera trijuga*, and these two species are reserved as royal woods throughout Rewah.

There are 'Notes on French Forests,' by Mr. A. Smythies, and an article on the 'Deodar in the Dhára Gád Valley,' by Mr. Fernandez. The latter is to be continued, and it is the first instalment of the results of recent measurements and observations. These would probably be useful and instructive to the many practitioners who have charge of specimens of *Cedrus deodara* planted in this country. The Deodar avoids southerly slopes. It avoids also the bottoms of ravines and valleys, and all similar damp, cold places. It requires a well-drained soil, and a certain appreciable amount of insolation or direct sunshine. As regards the composition of the soil, Deodar is extremely accommodating as long as the drainage is sufficiently free, and as a forest crop it takes away little or nothing from the soil. Deodar in general affects a climate that is more or less Alpine in character. In these forests, or elsewhere, Deodar is pre-eminently a shade-enduring tree, especially during the first half-century of its life. Seedlings will remain under the densest cover for years, the mean age of saplings averaging seven feet in height and six inches in girth at the base, and growing under a complete leaf canopy was thirty-nine years. By figures given, it is proved clearly that young Deodar can not only survive for many years under a dense leaf canopy, but that a dense leaf canopy is less hurtful to it than complete exposure to weather influences, the most destructive of which are evidently drought and strong heat, and the superincumbent snow which breaks the leading shoot and bends down and distorts the thin, flexible stem. The average rainfall of the district at 7,000 feet elevation, for the last thirteen years, reaches the great quantity of 61 inches; and the maximum temperature sometimes reaches 82° Fahr., while the minimum sinks as low as 28° Fahr. The Deodar reaches the diameter of 2 feet at the age of 120 years, and at an advanced age it sometimes attains the enormous height of 164 feet.

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* The *Indian Forester* for October. Edited by W. R. FISHER, B.A., Deputy Director of the Forest School, Dehra Dun. Printed at the Civil Engineering College Press, Roorkee. 1883.

Among numerous other interesting articles are to be found some extracts from the *Timber Trades Journal*, and a short biography of the late Dr. Gustav Heyer, Privy Councillor and Professor of Forestry in the University of Munich.

At the end of the Magazine are extracts given from official Gazettes relating to personal changes, appointments, and promotions in the Indian Forest Service.

THORN HEDGES AND THEIR MANAGEMENT

WITH most of what Mr. Andrew Slater, jun., said about the management of hedges in your June and July issues I quite agree; but there are some points on which we must differ. I quite agree with him generally in the way he advised the soil should be prepared previous to the planting of the hedge therein. If the hedge is liable to be assailed by cattle from both sides, then both sides should be suitably fenced off previous to planting; and in doing so about 3 ft. may be allowed as hedge space in the centre, and the fences may stand about 4 ft. back from this on each side, or in all there may be about 11 ft. between the protecting fences; and where land is very valuable, and shelter not needed, it should be worth remembering that, when compared with ordinary wire fencing, this means a loss to a farmer of about an acre in every 1,300 yards of hedges, for the time being.

Mr. Slater is quite right in approving of planting one line or row of plants in a hedge only, and not two.

Weeds of all kinds should certainly be kept in check by repeated cutting; and, if not, the hedge is injured, if not ruined, just in proportion to the neglect of this.

Everyone who plants a hedge would like it to become its best in the least possible time; now, if I understand Mr. Slater aright, he proposes to accomplish this desirable end by annually allowing its height not to increase above six inches, or its breadth more than three inches. By this means he retards root-growth, and consequently the accumulation of vital force, and therefore prevents the hedge gaining that strength it might have, in a given time, if otherwise treated. The better way to do would be to switch back with a hedge-bill the more vigorous-growing plants, annually, both at the top and at the sides, to about the line of those less vigorous, giving the hedge at the same time as neat an appearance as possible, and at every switching the wedge shape, with a little swell about the centre of its sides; by these means the greatest area of foliage would be exposed to the invigorating action of sunlight, and the weakest plants would not be too much shaded, and the hedge would be well furnished with numerous lateral branches down to the ground, rapidly increasing in strength with age. As soon as the hedge reaches 4 to 5 ft. high, by 2 to 3 ft. broad at base, it should be annually pruned or switched back to the 'old cut,' and so soon as it is strong enough to resist farm stock the protecting fences should be discontinued; but then, stock on bare pasture are very likely to eat all the young shoots of the side next them, so much so as to leave the hedges but little to switch at the end of the season; and if these hedges are not of vigorous growth, and a sheep and lamb stock pasturing alongside them, it would be strange indeed if the lambs did not wedge their way through at the bottom of some parts and into the adjoining field—it may be wheat. The sheep follow their young: paths are made; the attention of cattle, if pasturing there also, are drawn towards these, they bolt through, and the hedge is a fence no longer. To prevent all this, if strainers and winding pillars were placed in the line of hedge, as if for a 3½ ft. wire fence, at the time of planting, it would be a great improvement, before removing the protecting fences, to run three wires in, drawn through between the branches of the hedge near the bottom, and with the lightest description of fencing staples to staple these wires, in the usual manner, to the strongest plants in the hedge, at about three yards apart, and this would effectually keep out sheep, and a fourth wire at 3½ ft. above ground, stapled in a similar manner, would resist cattle; the hedge would then be a wire fence and hedge all in one.

To those who may fear that this would utterly destroy these plants and in the end ruin the hedge, I may remind them that only about three per cent. of the plants would be touched at all, and may state that in 1870 I tried the same thing on a hedge, and that as yet no one can tell from its appearance which are the plants to which the wires are stapled.

To strengthen hedges or fill up gaps by the means often seen used is positively very injurious as well as unsightly. To drive posts in the ground when the hedge is either open or weak is both to bark and seriously split up the roots, which are the most important parts of the hedge to be carefully preserved uninjured; and to nail on rails on these posts, or to pack in branches behind them, is to crush up and shade so much of the hedge from the sunlight, to its injury.

D. M'Corquodale.

THE CHARLTON HUNT.

THE bonds of sympathy between men in country districts are undoubtedly drawn closer by the custom of all classes meeting in the hunting-field. Fox-hunting affects the rural districts in many ways. It attracts the great and small, big men and little men, lords, squires, and every class of farmers. And, besides the social influence of the sport, and its influence on men, it affects the breed of horses. Not to carry this argument further, those who observed the recent accounts of the first meet of the pack of foxhounds lately purchased by the Duke of Richmond, may be interested in learning that the earliest pack of foxhounds in England was kept at a retired spot, called Charlton, situated on the north side of the ridge of the South Downs, while Goodwood, the Duke of Richmond's seat, is on the south side. Standing on the racecourse at Goodwood, you overlook the very spot—a retired, solitary, wooded district—where the fox was first hunted in this country in a scientific manner, with hounds trained for the purpose, and 'the field' following.

Fox-hunting, therefore, is comparatively a modern sport. The name of the Duke of Monmouth, who was brought to the scaffold for his unfortunate connection with a not very terrible rebellion, may serve to fix the date when this indispensable amusement of the country was first invented, for the Duke of Monmouth was its earliest patron and the chief supporter of the pack at Charlton. It appears that all the materials for a hunt already existed—horses and hounds, with ladies and gentlemen capable of riding across country. The earlier sports of the country had encouraged horsemanship. From the times when knights and squires came to Mass with their hounds at their heels, and ladies with their merlins perched on their gloved hands, all the materials and accomplishments necessary for fox-hunting had existed, and only a little special training was required.

The earliest accounts of the Charlton Hunt lead us to suppose that no difficulty was experienced in obtaining hounds to hunt the fox, and none whatever in obtaining horses which could carry their riders straight over 'plough and pasture.' The Duke of Monmouth was a lover of horses and a sportsman, and he readily found among his friends the members of the hunt. The little hamlet of Charlton having been selected as head-quarters, an assembly room, called Fox Hall, was erected for the entertainment of guests at night; several gentlemen from distant counties erected their own shooting-boxes on the spot, where they resided during the season, rendering one of the most retired spots in Sussex a place of fashion and peculiar bustle, a Melton Mowbray in miniature. Others lodged, *pro tem.*, in the farm-houses of that locality, adjoining to Fox Hall where the Duchess of Monmouth presided for the evening.

No doubt the Charlton Hunt brought grist to the mill of the farmers, and it brought among them some first-rate horses, and some ladies and gentlemen of the first rank who knew how to ride them. It may be easily believed that fox-hunting was from the first a popular amusement.

Some years since, in an old farm-house at Funtington, in West Sussex, a precious document was discovered, relating to the Charlton Hunt, and consisting of a manuscript account of a run with the hounds. The *Field* publishes similar narratives every week in the hunting season; but it has rarely published a more graphic account of a harder run than that of a hundred and fifty years ago. At any rate, for the sake of comparison, the Funtington Manuscript is here reproduced. Commencing with a heading, it is as follows:—

'*A full and impartial account of the remarkable Chase at Charlton, on Friday, 26th January,* 1738.

'It has long been a matter of controversy in the hunting field, to what particular county or set of men the superiority belonged. Prejudices and partiality have the greatest share in these disputes and every society their proper champion to assert the pre-eminence, and bring home the trophy to their own county. Even Richmond pack has its Dymoke.* But on Friday, 26th January, 1738, there was a decisive engagement on the plains of Sussex, which, after ten hours' struggle, has settled all further disputes, and given the brush to the gentlemen of Charlton.

'Present in the morning:—the Duke of Richmond, the Duchess of Richmond, Duke of St. Albans, Lord Harcourt, the Lord Henry Beauclerk, the Lord Ossulston, Sir Harry Liddell, Brigadier Henry Hawley; Ralph Jennison, Master of His Majesty's Buckhounds; Edward Pauncefoot, Esq., William Farquhar, Esq., Cornet Philip Honeywood, Richard Biddulph, Esq., Charles Biddulph, Esq.; Mr. St. Paul, Mr. Johnson, Mr. Peerman of Chichester, Mr. Thompson; Tom Johnson, Billy Ives, Yeoman Pricker to His Majesty's Hounds; David Briggs and Ninn Ives, Whippers-in.

'At a quarter before eight in the morning, the fox was found in East Dean Wood, and ran an hour in that cover; then in the Forest up to Puntice Copse; through Heringdean to the Marlows, to Covey Coppice back to the Marlows, to the Forest West Gate, over the fields to Nightingale Bottom, to Cobden's Draught, up his Pine Pit Hanger, where his Grace of St. Albans got a fall; through West Dean

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* Name of the King's Champion.

Forest, to the corner of Collar Down (where Lord Harcourt blew his first horse); crossed the Hackney-place Down, the length of Colney Coppice, through the Marlows to Heringdean, into the Forest and Puntice Coppice, East Dean Wood; through the lower Teglease, across by Cocking Course, down between Graffham and Woolavington; through Mr. Orme's park and paddock, over the heath to Fielden's Furzes, to the Hurlands, Selham, Ambersham, through Todham Furzes, over Todham Heath, almost to Cowdray Park, there turned to the limekiln at the end of Cocking Causeway, through Cocking Park and Furzes, there crossed the road and up the hills between Bepton and Cocking.

'Here the unfortunate Lord Harcourt's second horse felt the effects of long legs and a sudden steep; the best thing that belonged to him was his saddle, which my lord had secured; but by bleeding and Geneva (contrary to Act of Parliament) he recovered, and with some difficulty was got home. Here Mr. Farquhar's humanity claims your regard, who kindly sympathised with my lord in his misfortunes, and had not power to go beyond him. At the bottom of Cocking Warren the hounds turned to the left, across the road, by the barn, near Heringdean, then took the side to the north gate of the Forest (here General Hawley thought it prudent to change his horse for a true blue that staid up the hills; Billy Ives also took a horse of Sir Harry Liddell), went quite through the Forest, went through the Warren above West Dean (where we dropped Sir Harry Liddell), through Goodwood Park (here the Duke of Richmond chose to send three lame horses back to Charlton, and took Saucy Face and Sir William, that were luckily at Goodwood; from there, at a distance, Lord Harry was seen driving his horse before him to Charlton). The hounds went out at the upper end of the park, over Strettington Road, by Sealy Coppice (where his Grace of Richmond got a summer set), through Halnaker Park, over Halnaker Hill, to Seabeach Farm (here the master of the staghounds, Cornet Honeywood, Tom Johnson, and Ninn Ives were thoroughly satisfied), up Long Down, through Eartham Common Fields and Kemp's High Woods (here Billy Ives hired his second horse, and took Sir William, by which the Duke of St. Albans had no greatcoat, so returned to Charlton). From Kemp's High Wood the hounds took away through Gunworth Warren, Kent Rough Piece, over Slindon Down to Madehurst Parsonage (where Billy came in with them), over Poor Down up to Madehurst, then down to Houghton Forest, where his Grace of Richmond, General Hawley, and Mr. Pouncefoot came in (the latter to little purpose, for beyond the Race Hill neither Mr. Pouncefoot nor his horse Tinker cared to go, so wisely returned to his impatient friends), up the Race Hill, left Sherwood on the right hand, crossed Offham Hill to Southwood, from thence to South Stoke, to the wall of Arundel River, where the glorious twenty-three hounds put an end to the campaign, and killed an old bitch fox ten minutes before six. Billy Ives, his Grace of Richmond, and General Hawley were the only persons in at the death, to the immortal honour of seventeen stone and at least as many campaigns.'

The Charlton Hunt came to an end, and the kennel was removed for a short time to Goodwood, afterwards to Petworth, whose owner, Lord Leconfield, is still the M. F. H. of his locality.

H. E.

LARGE OAKS.

IN reading Mr. Evershed's 'Notes on Trees' in the last number of 'FORESTRY,' I was induced to turn to a record I have in my possession of a traditional Oak which once flourished in the Valley of Ganllwyd. This valley is situated five miles northward from Dolgelly, the county town of Merioneth. The high road from Dolgelly to Carnarvon, *via* Tan-y-bwlch, runs through the valley, which is well sheltered from the east by the mountain whose summit is scored horizontally by the 'Precipice Walk,' so well known to tourists, and from the boisterous south-west by the chain of mountains on the opposite side, stretching away northwards at right angles to the Barmouth estuary. The shelter from the cold east and stormy south-west is therefore as complete as it can be, and yet the slant of the intermediate flat ground towards the south admits the sun for the best part of the day freely.

In this valley, close to the little inn of Tyn-y-groes, stood the great Oak called 'Brenhinbren-y-Ganllwyd,' or King of Ganllwyd. Its exact site, its dimensions, age, and date of its death, are familiar traditions with the old native inhabitants of the district, many of whom, no doubt, could vouch for the facts by the direct testimony of eye-witnesses communicated personally to those who are still living.

From these, as well as on the authority of a well-known antiquarian in Carnarvonshire, whose name I could give, if necessary, I have it on record that the tree was cut down in the year 1746 ; that it had to be uprooted, being too thick in the girth for any cross-cut saw or other implement then in use ; that the girth at three feet from the ground was 24 feet 8 inches ; the height from the ground to the top, measured after the tree was down, 180 feet, and to the first fork 25 feet ; that the bark, stripped with iron crowbars, weighed 6 tons ; and that the butt sold for £60. A piece of one of its branches was taken to make an axle for a large water-wheel at Ynys-y-maengwyn, near Towyn, another for a windmill axle in Anglesea, and another for the same purpose at Merthyr Tydvil. In the hall at Hengwrt, formerly belonging to the old county family of the Vaughans, there is a table made from the tree, inscribed 'Brenhinbren-y-Ganllwyd.' The age of the tree depends on too uncertain a tradition to enable me to refer to it with any reasonable confidence.

The Welsh are very fond of apostrophizing any such national object in verse. It has been immortalized in the Principality by Lewis Morris, the Black Bard of Anglesea, in a poem written in the Welsh language, a portion of which I venture to translate in prose, as follows :—'Thou are a wonder unto me—thy circumference and thy immense size. The King of Trees in Ganllwyd has been cut down. A straight handsome tree thou wast, sixty yards, the tower of Ganllwyd : it was barbarously thrown from the hearth where it stood. It grew to be a captain: the acorn failed not ; all men praised it, and the old pious ancestors, who were extremely wise, nourished it and kept it alive ;' and much more to the same effect. The tree stood on my own property.

C. R. W.

FORESTAL NOTES.

ALTHOUGH a subscriber to 'FORESTRY,' I had not seen the number for July last, which may perhaps have been mislaid, until you kindly forwarded it the other day to my partner, Mr. Brace, whose article on the 'Weights of Forest Seeds' it contained. I had thus missed the connecting link of an interesting discussion—continued in 'FORESTRY' from May to September—on the value of the Scotch Pine as an absorbent of moisture in wet soils.

Mr. Webster's high estimate of this quality of the tree in question is completely borne out by my thirteen years of experience and observation of Pine-planting and management in this district of Central France—the Sologne—a triangle of large extent, contained between the historical towns of Orleans, Blois, and Bourges. Its soil is generally composed of a sandy surface and a retentive clay bottom; so that a great portion of its surface, dry and hot in summer, wet and cold in winter, is unfit for agriculture, and either has been, or ought to be, utilised and improved by planting.

The trees generally planted are Pines, and for three reasons: they drain and sweeten the soil; their cover keeps down heather and furze; and, lastly, they take more kindly to bad soils, come away better, and attain value more rapidly, than deciduous trees. The two species principally grown are *Pinus maritima*, or Pinaster, and *P. sylvestris*, Scotch Pine.

Their effect in drying the soil is infinitely superior to that of the hardwoods, as we have ample opportunities of ascertaining here, woods and plantations of the latter being scattered all over the district. The superiority of the conifers in that respect is evidently due to the fact that they continue throughout the winter, when evaporation is most required, to absorb the water in the soil by means of their powerful searching roots, and to evaporate it through their leaves; while the vital functions of the deciduous trees are suspended. This connecting movement thus kept up between the soil and the atmosphere avoids stagnation, and, combined with the balsamic properties of the Pine, purifies the atmosphere; hence the high sanitary value of the tree in unhealthy climates, its action being similar to that of the Eucalyptus, though in a less degree. But to return to the simple question of their draining effect, it is certain that, in a wet winter here, we generally find dry footing in a Pine plantation, and seldom in a broad-leaved one, except where special drains have been opened.

Shortly after buying this property in 1870, I made a pond in the park I then laid out, the plantations of which were mostly of conifers; it was fed to overflowing by the drainage water I directed into it. It gradually dried up from the absorbing effect of the young plantations round it, and I was obliged, two years ago, to reduce its size by half, and to double its depth, in order to retain any water in it at all.

There are, besides, many instances in this country where the Scotch Pine planted on boggy ground, without any other preparation than a few shallow surface drains to allow of the plants *taking*, has thoroughly drained the land, and formed handsome and vigorous plantations.

THE December number of 'FORESTRY' contains a valuable article, signed R. H., on the characteristics of soils, which treats, among other subjects, of the means of preventing waste of nitrates—a subject to which special attention has been drawn by experiments at Rothamsted.

The *Journal of Horticulture* published, quite lately, an interesting article on that subject, recommending for gardens, instead of the usual winter fallow, an autumn crop of rip grass to be dug in against spring.

No one, I think, from a scientific point of view could object to this treatment, which, chemically, not only returns to the soil all the elements this crop has taken from it, but enriches it besides with the organic matter the crop has absorbed from the air; while, physically, the roots of the grass have not had time to bind the soil, nor to dry it by intercepting the moisture before it can penetrate to the subsoil.

Such is not the case, it seems to me, with the grasses, brackens, and heather that grow in woods. The sorts of weeds most abundant, generally are so from having remarkably powerful binding and searching roots, which take possession of the soil to the detriment of their neighbours, whether these be plants, shrubs, or trees. Certainly, if not carried off, they restore to the ground what they have taken from it; but I strongly suspect they continue using this humus for their own exclusive benefit. We must remember that 'old sward' becomes excellent plant-food only when ploughed up, and its own living organism destroyed. Like everything else, it must be dead before it can be used for food. So, in woods, grass and shrub growth become good humus *after they have been killed by the shade of the leaf-canopy.*

But, as all know, the requirements of forest growth are even much more physical than chemical. A *sine quâ non* for first-class development is the free circulation of water in the soil and subsoil, whence it is pumped by the roots of the trees, ascends into their leaves, and is evaporated in the atmosphere. This circulation of water is checked by the roots of grasses, which bind the soil and absorb its moisture. In a dry summer, if sward be dug up after heavy rain, it is found that the moisture has not penetrated below the surface, whereas loose soil absorbs it to a certain depth. The drying and binding powers of heather are infinitely worse: when this plant is continuous and well-rooted, one can hardly get a spade into the soil.

This consideration, weighty anywhere, may not be all-important in damp climates like that of Scotland or Ireland, but in even moderately dry countries it is so, and continuous shade is in most soils an absolute necessity for the healthy growth of timber.

In the forest of Fontainebleau, wherever the Oak and the Beech have been associated, both have in general done well, from the shade fforded to the ground, and the beautiful humus deposited by the Beech. But in some parts of the forest the Beech was allowed to die out, and an attempt made to cultivate, instead of this mixture, continuous masses of Oak, as being more valuable. The Oak, unable with its light cover to kill off secondary vegetation under it, gradually fell off and died out, and foresters are now obliged to carry out the regeneration of the districts thus ruined by means of Scotch Pine.

As for vitrification in the soil, it may be more slowly effected by tree-agency alone than by that of the growth of grasses ; but the trees, when sole possessors of the soil, get the benefit of all the nitrates formed ; and we may suppose that pure forest can always develop the amount of these salts necessary for its requirements, which, as R. H. observes, are so much more modest as regards chemical elements than those of cultivated plants. This seems evident from the fact that, wherever trees are not overcrowded, their growth is finest where the leaf-canopy is continuous and the humus furnished by it most abundant.

I can, therefore, see no reason suggested by the interesting researches in question for departing from the good old rule of keeping forest soil as clean as possible, and utilising all secondary growth by killing it and converting it into humus as soon as we can, by making our leaf-canopy continuous.

Of course secondary growth must not be proscribed everywhere, being invaluable to the artist and the naturalist, and for the pleasure of the general public. I have treated the subject from the forester's point of view exclusively.

DAVID CANNON.

ERRATUM.—In the hurry of going to press with our December number the woodcut on page 101 representing a group of white willows (*salix alba*) was inserted with the erroneous description of " Lombardy Poplars " in Mr. Boulger's article on " Beauties of British Trees." The description referred to the cut on page 99, which was simply named " Poplars," instead of " Lombardy Poplars."

" GUIDE TO METHODS OF INSECT LIFE."—Miss Ormerod has courteously sent us the advance sheets of her new book on Insect Life. It is published by Simpkin, Marshall, & Co., is fully illustrated, and its price is to be only 2s. We shall probably return to its subject shortly. Meanwhile, let us add that the authoress in a note to us says : —" I hope the book may in some degree serve as the *plainly worded* introduction to a *practical* knowledge of insect life that I am often asked for ; but also I have endeavoured to make it a kind of pictorial guide, so that the *practical* reader may see the figure before he has time to get puzzled."

ON ENGLISH FORESTRY.

THE letters we have printed on American Forests may recall attention to an interesting discussion which took place in the House of Commons. On that occasion Sir John Lubbock secured for himself the hearty sympathy and thanks of all who still yearn after the landscape of old England, more beautiful though less profitable than the pathless woods of the New World, in which Englishmen are now invited to invest. With scarcely an exception, these sympathisers are the whole of our countrymen. We are all 'Foresters' by nature. We all love trees and their inhabitants. We all pine for the woods, from which we feel banished by the sad necessity of earning a livelihood, or acquiring a position, amid less picturesque scenes. As a matter of sentiment, of science, and, as it appears, of imperial utility, we ought to know trees and all about them. They are the most magnificent of Nature's productions. They are structures grander even than our most costly edifices, frequently more lasting, and never obsolete in style or fashion. This particular branch of creative power is the most envied prerogative of our aristocracy. They have parks; they can keep them up; they can even make them. A man of great intellect in the last generation, who did not quite know whether to worship the gentry or to excommunicate them, said at last he knew not what good they did except that they made England picturesque. Yet the fearful question *Cui bono?* must immediately present itself to everybody who attempts to measure forestry by the Parliamentary scale. It appears we do actually want men learned and practised in forestry for the restoration of our forests in India, and that, perhaps, Ireland may be planted here and there with advantage, but, unhappily, there is no investment so slow, so precarious, so likely to be unremunerative, as planting of all kinds. The planter must be a rich man. He must have more money than land, or wits either, his neighbours will often say. It is indifferent land he is dealing with, for he cannot afford to lose the certain and immediate harvests of his good land. He has to bury his capital in the soil for many years. He has to trench, to dig, to weed, to fence, to protect from depredation, and to wage a continual war with wind, frost, and drought. He seldom escapes the fate of those who work for others, not for themselves. In a few years he may begin to thin, and his successors in the next generation may have something like timber to dispose of. But when the forest has been at last created, there comes the greatest difficulty of all. It is a difficulty upon which we wish to speak tenderly and cautiously, for it is a painful one. The unfortunate man who has to sell English timber of any kind whatever finds himself at the mercy of the buyers. If he has been at the pains and cost of a valuation, he finds it no rule. He gets so little offered for his trees that he thinks they may as well stand. If he has "thrown" them himself, he has to wait long for a man to come in to his terms. A fine-grown Oak a century old looks as if it ought to be valuable, while you may be thankful if you are offered a five-pound note for it. Our Fir plantations yield scaffold poles, but no good builder will use English Pine when American and Baltic are so vastly better and everywhere obtainable. Heart of Oak used to be called English iron, but English iron has thrust it quite out of the market. Even little faggots for lighting our fires are made up of the refuse of our saw-mills and workshops. We have known a good housekeeper forty miles from London, surrounded by thousands of acres of Fir, Birch, and other trees, much of it good for nothing but burning, get all her firewood from a greengrocer in Pimlico. She got what she wanted, and just as she wanted it, and she knew what it cost, without all the trouble of cutting down, lopping, carrying, sawing, or making into faggots, piling, and what not. Half a century ago there were long belts of Fir plantation stretching over our chalk downs. They were evidently failing for want of nourishment. A whole tree, or "pole," as it would be called, could be bought for sixpence, or for fourpence; the former if the seller was to cut it down and carry it, the latter if you were to do this yourself. Even so you would find it cheaper to get firewood in almost any other way.

'On the Continent home-grown timber has much protection by circumstances as well as by law in the competition with foreign timber. Coal is not so accessible and cheap anywhere as in this island. The State here has no *forêts* to protect for its own sake. The sustentation of the *forêts* for the sake of the Government, the dynasty, and the *noblesse* was not without its benefits to France and other continental countries, though industry suffered, and society was endangered by the taxation of some classes for the profit of others. The French now find they have reduced their *forêts* too much for the climate, and have to replace them. It is our gradual and spontaneous improvement that cleared our own woods, and has now left us much less woodland or open country than we had a century ago, or within living memory. Common land of all sorts has long been unpopular with economists, and only popular with communists and a certain school of sentimental politicians. Landowners, too, have waged war with commons for their share in breeding poachers, paupers, vagrants, and the itinerant beggars, always collecting money to replace their lost horses, cows, pigs, or donkeys. Commons, it must be confessed, are apt to be a reign of disorder. Even the trees allowed to stand on them are seldom good for much. It has now come to this, that the only planters and preservers of trees are our country gentlemen, and that they persevere in this very unprofitable cultivation for the sake of the landscape and of the game. We have many beautiful parks; but no longer any forests, and not many considerable plantations. What we have of the latter have generally proved to be mistakes. At the beginning of the century there was a universal movement, on patriotic principles, to create what was expected would be a constant and perennial supply of timber for the navy. But people planted the wrong Firs and the wrong Oaks. At present this does not so much matter, as we can do without either of them. The only serious mistake is that our grandfathers could not possibly foresee that Larch was the only Fir suitable for railway sleepers. Certain woods are of value for special purposes not involving a large demand. The Elm has its sad use, and will be wanted as long as people live and die, but is good for little else. It is a bad neighbour, and a treacherous member in any design for beauty's sake. There are few avenues, indeed, that do not tell of destructive storms. The Scotch Fir is equally apt to disappoint. Beeches hold to the ground, but suffer internal decay sooner than their admirers expect, and then they leave sad gaps. But now for a long period the enthusiasm and the science of our noble and gentle foresters have run into evergreen trees and shrubs, especially those from America and Australia. Our gentry are very little at their homes in spring, or in summer, or, indeed, till far into autumn. They want winter gardens. Parliament has much to answer for in this matter. It has really changed the face of the country. The present generation little know how recent is the introduction of the noble evergreens now towering in large picturesque masses round our great country houses. Half a century ago Lord Grenville housed all his exotic Pines, at Dropmoor, under enormous wigwams to protect them from the inclemency of an English winter, so new were they and so little was known of their hardy nature.

That there is a future in this matter, and that we may not know it—in other words, that there may one day be great occasion for large and well-stocked forests—all must admit. Sir John Lubbock may one day prove a true prophet, though, like other prophets, little attended to. For the present the whole question is ruled by pecuniary considerations. Our wealthy landowners are the only men to plant on a large scale. They are the only people to want foresters, and the science of forestry. But they will not plant for profit in the face of many a mortifying fact. They will not produce what the public will not take at any price. They plant only for sporting or ornamental purposes. These are matters of real importance, for they are the reasons why many reside in the country, in the midst of their own people. But the requirements of beauty and of sport are apt to dictate narrow lines of choice, and they can hardly be what we have most in view. Yet we feel very sure that a strictly economical, or commercial, system of forestry would gain very little attention. The young will certainly think most of what pleases the eye or promises amusement. As to the elders—that is, planters past fifty—they are seldom likely to pursue a plan promising no results till they are out of the way, or too old to enjoy even the work of their own hands. True there are people who plant, as there are people who build, on the verge of the grave, but they are not many, and they are exceptional. Whom may we hope to enlist in the pious work of improving the England of the future, and doing good to a generation more likely to detect our mistakes than to thank us for our successes? Sir John Lubbock pleads for the honour of his country. It is disgraceful to have to send to France for foresters to do the necessary work of planting in India. It certainly is; and though we suspect the pupils at Cirencester have enough to learn without adding forest trees to their course of studies, still Her Majesty's Woods and Forests ought to be found equal to the emergency, and ought to be able to cultivate and diffuse the art and science of forestry as well as employ it just for estates under their own care.'—*Times*.

PINUS AUSTRIACA.

I HOPE you will allow me, as I have taken in your Journal from its very first number, to point out to your readers what perhaps is known to but few of them, and may be of use to some of them, viz., the extraordinary adaptability for transplantation of *Pinus Austriaca*.

Some ten to twelve years ago I had occasion to enlarge my park, taking into it some downs, situated about five hundred feet above the level of the sea, and exposed to strong south-westerly winds. Besides planting in the usual way, I was desirous of trying some trees for immediate effect. I had little or no expectation of succeeding with any of them, but I thought it worth while trying the experiment in the interests of arboriculture.

Almost every tree that might be supposed to be endowed with a chance of vitality in such an exposure has been tried in succession—Beech, Norway Maple, Sycamore, Birch, the Wild Cherry, Mountain Ash, and Whitebeam (I am speaking of specimens well-chosen and stocky, about ten feet high), but the result has been, as might have been foreseen, a disastrous failure. But what I did not foresee was that *Pinus Austriaca* has succeeded in every case.

I select, from the old clumps, trees which would otherwise have to be cut down to make way for others in the process of thinning, and remove them to their future sites *without any preparation.* My transplanting apparatus is an extremely simple one, constructed by the village blacksmith, and borrowed from a model which I originally saw in use by my friend and neighbour, Mr. Bonham-Carter, late M.P. for Winchester, and Chairman of Committees in the House of Commons; than whom no man in Hampshire knows more about trees. However, for specimens of this size,—10 to 12 or 15 feet—no special machinery is required. The great thing is to move them with a great ball, preserving as far as possible the fibrous roots. I must repeat that, when so removed, I have not found one of them to fail in the most exposed situations, and on the poorest chalk soil. The first year they naturally do but little; but the second year they are quite at home.

Of course this process could not be adopted on a large scale as it would be too expensive. I merely mention it for the benefit of those who wish to form at once a few groups of handsome young trees on bald and elevated spots near their abode. For this purpose the *Pinus Austriaca* is, in my experience, unique. Those who do not happen to have at their disposal specimens suitable for removal, can buy them at good nurseries at an average cost of 3s. 6d. a head. I have tried these also, and found them succeed well; but as, of course, there are no balls to them, they will require very careful staking. Where there are cattle or horses, they will have to be protected by wattle or other fences. Against sheep, I do not fence at all.

The *Pinus sylvestris* (Scotch Fir) does not transplant nearly so well. The *Laricio* I have not tried, to any extent, but the results have been fair. The *Cembra* will also succeed at times, as also the *Pinus Jeffreyi.* But all are very uncertain; whereas *Pinus Austriaca* is, with care, a certainty.

INSTRUCTION IN FORESTRY.*

BY SIR RICHARD TEMPLE, BART., G.C.S.I., D.C.L., LL.D., ETC.

FORESTRY is at first sight a very picturesque subject, and indeed I might, if time permitted, attempt to depict to your imaginations the sylvan glories of the earth. I should be delighted to do so, as I am extremely fond of sketching the trees in the forests which I am about to mention, and have painted them frequently. But I must not be tempted to stray into these charming paths.

I apprehend that forestry is a subject very little attended to in this country (England), and I must ask you to consider what is forestry? No doubt you will be inclined to say you have never attended to it or thought about it, and that being the case you will be still less able to give an opinion as to what is instruction in forestry. I will endeavour to give you a practical answer, but in order that I may do so I must ask you for a few minutes to accompany me in imagination upon a short tour round the world.

We will begin our tour with our own native land, and we must at once admit that in no country is forestry so little thought of as it is here. And why? Because England does not lie under the necessities which press upon other nations and compel them to study forestry. We do not trouble ourselves much about forestry, for three reasons. First, because we have, as is generally known, a superabundance of rain. Secondly, because we have, owing to the rainfall and to our naturally rich soil, a perfect carpet of vegetation, which preserves from destruction all the rich 'humus' (that is the scientific name) or soil with which the land is covered. Thirdly, because we are blessed with the Gulf Stream of the Atlantic, which moderates our climate. If you have travelled in Scandinavia or Canada you will know the decided difference the Gulf Stream makes to our climate. If we had not that stream we should be obliged to do something in the direction of restoring those forests which were the glories of the land in the time of Robin Hood. And how about Scotland? It is richer in forests than England, but still there remains the fact that at the best within the last fifty years Scotland never had more than a million of acres under forests, and that is just one-twentieth of her total area of twenty millions of acres. Now, despite the efforts of arboriculturists, and of public-spirited men in Scotland, even that comparatively small acreage of forest land is dwindling away. The

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* A speech delivered before the National Association for the Promotion of Social Science.

Scottish Arboricultural Society said last year that it had fallen down to about three-quarters of a million, or 750,000 acres. This is the state of things in Great Britain. Let us now cross to Scandinavia. In the northern part of Norway there is something of the same sort of oblivion of forestry that there is in this country, but in Southern Norway—that picturesque Norway we resort to — and throughout Sweden, the area of forests is remarkable, and constitutes the leading feature in the Scandinavian landscape, covered with Pine forests. I have been sometimes in the midst of grand scenery where, from the ground below up to the lofty peaks above, there was nothing but one waving mass of Pines. That is the characteristic of Norway and Sweden ; there they preserve forests in an enlightened and patriotic manner for the preservation of the national wealth. It pays them wonderfully well to do so. It is, indeed, the main source of their wealth. It is the most precious of all material possessions to them. Then, again, I have recently travelled in Germany. I have observed that the Germans, though they have a vast growing population, nevertheless have preserved most carefully all the forests on their principal hills, that is to say, in the upper basin of the Rhine, of the Elbe, and in many other places. Their forest preservation is a model for all other nations. They do it, not for climatic reasons, but for the preservation of the national wealth. The same remark applies in Eastern France, that is to say, to the Vosges mountains, in the arena which was the scene of the Franco-German War. There is also Nancy, which is the great forest school of France. I am not here in any way to pronounce a defence of or panegyric upon the administration of the late Emperor Napoleon the Third, but whatever may have been his faults of ambition, nevertheless he was one of the first men in France to introduce a system of sound forestry in that country. This has been done in Eastern France for the preservation, again, of the national wealth, rather than for climatic reasons. Now, I have referred to three countries—Scandinavia, Germany, and Eastern France, all of which maintain their forests for the national prosperity and for the supply of the markets of the world. It is very lucky for us in Great Britain that there are such sources of the supply of foreign timber. We get our timber, as you know, from Scandinavia and Canada.

Next, the art of forestry is cultivated in some other countries I am about to mention, not only for the augmentation of the national wealth, but also for the sake of preserving the moisture and fertility in the soil, and for maintaining a temperate climate. For ensuring a temperate climate to the inhabitants, the first to be mentioned is Southern France. The guide-books most familiar to tourists tell of the immense injury wrought in Southern France by the destruction of the forests which used to exist there. In consequence the ground has been washed and carried away, and barrenness succeeds to fertility. Then you have long periods of drought, followed by terrible floods and inundations, many of them being greatly destructive of life and property. This has notoriously been the case in Southern France, as it has also been in Italy and in Spain. I fully believe that the destruction of forests in Spain is as great as anywhere in Southern Europe. Turning to Russia, we know that Russia is a country of forests, naturally. But if you travel there you will find that Birch forests have largely succeeded to the Pine. This means that where Pine forests have been cut down without any provision for reproduction, Birch forests grow up. Whenever you see a Birch forest there, you will know that a reckless, unscientific felling of Pine trees has occurred. This has no doubt affected the climate ; the alternation of drought and flood is more frequent than it used to be between Moscow and Odessa. Come to the next neighbouring country, Turkey. Around Constantinople the destruction is patent to all travellers. Upon both shores of the Bosphorus the population has hardly a stick to bless itself with. Then sail down to the Levant. It was once the scene of the greatest events, and a region most blessed with wealth and fertility. It is now merely a shadow of what it was. The harbour of Ephesus has been dried up from the silting caused by deforesting on the adjacent hills. And crossing over to Cyprus, one of the latest regions to pass under British sway, there again you hear of nothing but destruction of forests. The goatherds of Cyprus have carried the day, and innumerable goats are still allowed to browse upon the young plants, with but little restriction; and the sylvan glories of Cyprus are now departed, and merged into darkness. Then again, cross over to Syria, the opposite shore, and you hear the same story there. Where now are the famous Cedar groves which existed in the days when Hiram sent timber to Solomon in Palestine ? There are only a few clumps of trees to mark what once was there. Where are the Oaks under whose shade the patriarchs pitched their tents ? Echo answers, 'Where ?' Only a few feeble remnants remain. I believe the only forests yet remaining within the old sacred limits of Palestine are a few of the Oaks of Bashan. But they are situated on the other side of Jordan, where the hand of destruction cannot reach them. Next pass on to Persia. Why, Persia used to be an enormous empire, but nowadays it is a decayed country. Where are now the vast populations it used to feed ? They have shrunk down to a petty figure of some seven or eight millions. This is, of course, mainly owing to the destruction of the forests. Alas ! the forests are gone, the streams are dried up ; and though the old water-channels remain, they may be very interesting to the antiquary, but are not useful to the political economist.

Now let us go to British India, for which we are responsible. India was once perhaps the most richly wooded country on the face of the earth. Its forests too have been largely destroyed. Under the native rule no care was taken, and when the country came under the British control, England was too much occupied with war and politics to attend to this question. Had we understood the subject scientifically, however, I have no doubt we should have found time to attend to it, But, of course, the reason why we did not attend was that we did not know how. After a too long slumber in the matter, we have awakened, and you will be glad to hear that, in spite of our past wastefulness of timber, nevertheless we have in India simply the largest Forest Department in the world. We have now got about 70,000 square miles of State forests within British India, under more or less of scientific care. Out of that number 25,000 square miles are under forestry of the most scientific kind that can be devised. The remaining 50,000 are under very tolerable and respectable preservation.

A word as to other countries in which England is more or less interested. You will hear the same story about the destruction of forests in Canada. When I was there last year so much public attention was being aroused to the subject that Arboricultural and Forestry Departments were being founded in Montreal. I am occasionally favoured with Canadian pamphlets, some of them bearing striking headings of this nature, 'Alarming Destruction of Forests in North America.' I know it is true, and I am glad to find that the Americans are beginning to be awakened on the subject. But it is to be feared that they will not succeed in preserving much of their forests.

In the West Indies you hear the same melancholy accounts of the devastation of forests there. It is, perhaps, possible that North America may get on without forests—that they will only lose a source of wealth. But in the West Indies they will not only lose a source of wealth, but they will injure their climate and fertility. A similar state of things exists in South Africa, for there also you hear the same sad story of the alternation of drought and flood. But this danger has not yet arisen in Australia, for the reason that the forests there are so far inland that destructive agencies have not yet been able to reach them. The future problem for Australia to solve is the best means of preserving the water supply,—of taking the scanty rivers close to their source, and husbanding them for the use of the great communities springing up near the coast. If the Australians destroy the forests, they will destroy their chance of future water supply and irrigation in a land which is proverbially thirsty.

Now I have given you some idea as to what forestry is, and the reason why you want it. You will perceive that it is not a mere abstract matter of science, but an immediate practical matter of importance, fitting for the discussions of a practical Congress like this. Forestry means three important things. Forests are to be preserved, not merely for their own sake, and not for the sake of any sentiment whatever, but for the use of man. They are the enemies of forest preservation who are always saying that forests are made for man and not man for the forests. You should not exhaust the forests for your own immediate benefit without thinking of those who come after you. Let us at once admit that, though forests may be made for man, yet, at the same time, they are made for his very judicious use. What, therefore, are the three points to which forestry should be directed? First, to the preserving of forests: the great object is not to lose your forests; once lost, it is a matter of the greatest difficulty to replace them by planting. Therefore, preserve what you have received from a bounteous Providence. The second point is the judicious use of the trees. The analogy of interest and capital in finance applies to our forests. We should utilise our forests in the same manner as that whereby a financier would use his capital —that is, make the best use of our talent by putting it out at interest. We are undoubtedly entitled to draw interest from the forests, but we should take only a reasonable quantity from them for our daily use—that, and no more. If we do more than that, we are adopting the very process which the spendthrift adopts when he lives upon his capital. The trees must by such means come to a final end; whereas, if judiciously managed, forests might yield an abundant interest—far more than any paltry 5 or 10 per cent.—for the use of man, and a national capital would thereby be preserved intact. The third object of forestry is undoubtedly planting. Although I have said that you cannot by planting replace vast forest lands, yet you may do much good, as has been done in India, by acclimatising many new kinds of trees.

You see, then, what forestry means; and, I think, if you have followed me in my general allusions to other countries, you will perceive that forestry ought to exist for three objects: first, the preservation of the national wealth; secondly, the retention of moisture in the soil, preventing the vegetation being destroyed; and for preventing the carrying away of the soil by rains and floods (because, recollect that forests act as a kind of binding power in the soil, the roots and radicles acting like a network or reticulation, or like veins and arteries, holding the ground together). The second object is, therefore, the retention of moisture and the preservation of rich soil. The third object is the moderation of the climate. Although you do not experience the want of moderation of climate here in England, you should feel for your fellow-countrymen and your fellow-subjects abroad in excessively hot climates, and inordinately long periods of drought, followed by destructive floods. I think you now understand in a general way what forestry means and why it is wanted.

But you will say, as practical people, that I was to have explained about instruction in forestry. I had, however, to explain what forestry is before I could explain instruction in it. You may ask, 'What do we want such instruction for?' In general terms, we want it for the sake of our domestic progress, as a nation or as an empire. We ought to have a school of foresters who will carry the scientific principles of forestry abroad to those wide regions where England has either direct political sway, or indirect national influence. After carefully going over the subject with the best foresters in Scotland, I have divided the instruction in forestry into ten heads. I shall only mention to you these ten heads; they are all strictly practical. The first is the method of preparing the land for forests; the second, the art of planting and transplanting; the third, the art of thinning and pruning, which represents the drawing of interest from capital, as I have said; fourth, the utilising of limbs and branches—the using of dead branches and limbs of trees for crate wood; fifth, felling; sixth, barking. This sixth head is a matter of great importance. Hundreds of thousands of tons of bark are wasted, and are likely to be wasted; whereas, by judicious forestry they are converted into a valuable commodity. Seventh, the leaving of standards for reproduction. Under that technical expression is comprised a most important operation. While there must be felling and cutting in the forests, we should not act as 'dogs in the manger.' We do not wish to prevent felling and cutting for the supply of markets and for the use of man. But it should be judicious. You cut a certain number of trees according as you want them. You cut one and leave another. You cut two or three and leave two or three, and those you leave are called standards—standards for reproduction. The seeds are scattered upon a soil which is chemically suited for the reproduction of that particular species. They fall upon congenial soil and up spring the new trees. We must learn how to leave standards for reproduction. The eighth is gathering produce. We are aware that all forests have a quantity of fruit—cones, nuts, and seeds—especially Pine forests, which are most valuable as articles of commerce in the manufactures of the world. Ninth, sawing and manufacturing of timber. Tenth and last, rearing and propagating in nurseries all young trees of established varieties, or else the introduction and acclimatisation of new varieties. Instruction in forestry should consist, I think, of these ten departments.

You will ask me, finally, to specify more particularly what is this instruction wanted for? It is wanted, first, for the raising up of arboriculturists and foresters at home. We cannot say we want the instruction for English forests, as we have got only a few of them, but we do want arboriculturists for the whole of the United Kingdom. We want foresters trained and educated to carry the principles of scientific forestry into all those regions of the earth where we have influence. Then, secondly—and this is most important—it is our duty, as a scientific association, to help to educate public opinion in this matter. I have shown you what great evils have resulted, not only in the British Empire, but in foreign countries, from a want of knowledge on this subject; and I will point out to you that popular knowledge of the subject is required in this country for two reasons. First, that the British people may realise the importance of forestry to the British Empire; and secondly, that, recognising the importance of the subject, they may be prepared to overcome the obstacles which always exist, even in the progressive British Empire, to forestry reform. These obstacles are of three kinds. 1. The reckless cutting down of woods by individuals, especially contractors and timber merchants, who desire to make the most out of the forests at the present moment, and care little as to what shall ultimately become of them. 2. The existence of a number of private customs which are dignified by the name of rights, though they are not entitled to that sacred designation. It simply means that a large number of persons, corporations, and bodies of men, desire to preserve sinister interests of their own in the forests without reference to the public benefit. 3. The obstructive influence of those who are the enemies of changes, even when demonstrably beneficial. Vested interests of this unlawful character die very hard indeed. You will see, then, why it is we desire that public opinion should be so educated as to give that moral support, without which beneficial changes respecting forestry cannot be carried out in an empire like this. Our object should be to send people from this country who will carry these principles abroad, and we may be thankful that in the British Empire the ultimate arbiter in these matters is public opinion, which this association may assist to enlighten. And we are not without encouragement. Efforts are beginning to be made. In the first place, Government is setting an example by no longer sending students to Nancy, to Baden, and other places in Germany. They are beginning to act upon the old British principle of self-help. But we must be thankful to the French and Germans. Many of the best conservators of forests in British India have been Germans. As we want self-reliance in forestry, I rejoice to see that the

Government itself is beginning to take steps in this direction. A forestry class has been established at the Royal College of Engineering, at Cooper's Hill, near Windsor. The matter has been taken up by the Scottish Arboricultural Society in Edinburgh, and by the Society of Arts in London. We must be thankful to these influential associations in Edinburgh and London. Lastly, there is to be an international exhibition of forestry this time twelvemonths in Edinburgh, and I trust that such an exhibition will carry us several steps forward in the cause of scientific forestry reform.

I think I have now given you a plain practical answer as to what is forestry, and then, as to what is instruction in forestry.

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AUSTRALIAN FOREST ADMINISTRATION.*

THE concise report under review, of the Woods and Forests Department of South Australia, describes another year of energetic industry and sustained progress in South Australia. The Conservator comes of a family who have both by practice and theoretical work greatly furthered British forestry, and his labours at the Antipodes are calculated to serve the same end. In the intervals of his arduous duties in the colony he has already published a book on 'Forest Tree Culture in South Australia,' and several parts of a work on 'The Forest Flora of South Australia,' illustrated with very large coloured plates.

The Forest Reserves of the colony called South Australia are situated in eighteen different localities, grouped into four districts, and comprise altogether about 147,000 acres. Enclosures for planting have been made to the extent of 4,140 acres, including 100 acres which were enclosed during the past year. Two hundred and seventy acres were planted with trees by the Department during the year, some twenty-five acres were sown broadcast with tree seeds (chiefly Eucalyptus), and twenty acres were sown with seeds of the broadleaved Wattle (*Acacia pycnantha*), a tree extensively cultivated in order to be stripped of its useful bark, which brings in a good price per ton. The total number of trees planted during the season was close on 194,000, of which 120,000 have survived. Broadcast sowing added 8,100 trees, and natural reproduction in enclosures 5,000, trees to the stock. Outside of the enclosures 52,000 natural-grown saplings were pruned during the year.

The revenue derived from these 147,000 acres of Forest Reserves is as yet, in the seventh year of conservancy, small in comparison with the large area, and it is still derived not so much from timber sales as from rents of lands leased for grazing. It reaches only £5,975, but it leaves a small margin after paying all expenses, and the forests since the commencement have cost the colony little or nothing. The large areas of forests have absorbed in each of these initial seven years about the whole of their moderate earnings; but in the meantime active cultivation has been building up a property of great intrinsic value, which in the near future will be enormously increased, and attended with benefit to the climate and rainfall, as well as to the general well-being of the population.

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* Annual Progress Report upon State Forest Administration in South Australia, for the year 1882-3. By J. EDNIE BROWN, F.L.S., Conservator of Forests. Printed by E. Spiller, Government Printer, Adelaide, 1883.

Appended to the report is a good sketch map of a great part of the 48,000 acres which compose the Forest of Wirrabara, in the northern district. The draughtsman or the forester who prepared it has forgotten to provide the map with a scale of miles and yards, and he has adopted a rather unconventional method of indicating important fences by showing palisades in perspective. While on the subject of imperfections, it may be mentioned that an attentive perusal has revealed only two insignificant slips in the letterpress, on page 17 '*Europeœ*' for '*Europœa*,' and on page 18 a redundant hyphen in '*Acer pseudo-platanus*.' The map of Wirrabara Forest is, in spite of the omission, a most useful one, and assists the reader of the report to a clearer comprehension of the detailed forest operations. The Wirrabara Forest of 48,000 acres seems to be favourably situated with its area intersected in every direction by creeks or small rivers, and it has a range of hills on its western side. The forest blocks have their principal fences and main boundaries running due west and due north, and they are abundantly supplied with roads converging and diverging towards different townships. As all forest maps should be, this map is conveniently arranged so that the top of the paper represents the north.

There was a very marked falling-off in the sales of timber this year in Wirrabara, as compared with the previous one, and there were only about 68,000 cubic feet of gum and sheaoak timber disposed of. This is to be accounted for—(1st) owing to the stagnation of trade consequent upon the past bad harvest, whereby there was little demand for sawn timber for building and other construction purposes; and (2nd) from the fact, that many of the farmers in the scrub lands adjoining the forest are at present clearing their land (in accordance with recent Parliamentary permission) and selling the wood at a reduced rate, thereby supplying many ontsiders with posts and firewood, who hitherto were in the habit of frequenting the forest for this produce. The total revenue of Wirrabara for the year 1882–3 was £1,590, which is not as yet much below the average; for, although the timber sales were low, the grazing rents furnished a large item of income. The total expenditure during the same time for wages and sundries was £1,440. This proportion between expenditure and revenue is natural, while the organized forest is only in course of formation. and it inculcates that the forest is being worked up towards a much higher state of productiveness.

During the year 1882 rain fell in Wirrabara Forest on 92 days, and reached a total of 23·6 inches. This is an increase of 3·5 inches on 1881. In England the average rainfall of the last ten years was about 26 inches, distributed over about 175 days in each year. The quantity of rain falling in Wirrabara seems, then, to be by no means insufficient, and not unfavourable to sylvan growth. During 1882 two thousand three hundred tons of water must have fallen on each acre of Wirrabara Forest. The difficulty probably is to save enough of this moisture to last over the four dry months from December to March: in February no rain at all fell. With this object it is probably desirable to maintain close leafage and continuous shade over the forest soil from as early a period as possible. It does not, however, seem to be absolutely necessary in making new plantations of the Gums to plant them so close together as three or four feet apart, because they grow so rapidly that they soon join their leaves over the interspaces; and, the Gums being rather costly plants, they have to be distributed over the enclosure with the utmost frugality. Many of the Eucalyptus, or Gum plants, have to be raised in the nursery in bamboo tubes, and transplanted, still with the bamboos, into the forest enclosure. Experiments have, however, been steadily advanced, with the object of trying to dispense sometimes with this expensive expedient. Some kinds of Gums seem to be less delicate and fastidious, and these have been successfully transplanted *open root*, that is, without any adventitious protection for their roots. The Conservator has also had important experiments carried out, as yet on a moderate scale, in cheaper methods of cultivation; and he has already been encouraged by favourable results from broadcast sowing with bush harrowing. This method, if it can continue to be successfully pursued, might permit of the enclosures being more thickly covered with the young Gums—a result which seems to have been accomplished by broadcast sowing in the Bundaleer Forest, where it would be still more needful than in Wirrabara. Rain fell in Bundaleer on 57 days, reaching a total for the year of only 17 inches; and during the summer months of January, February, and March there was no rain at all.

During the year, out of the 48,000 acres of Wirrabara Forest, about 3,000, situated in two blocks, were thoroughly gone over, and the natural saplings on them were thinned and pruned. This work was done between the middle of January and the first week in April, and some 50,000 fine healthy saplings were attended to. At this rate the whole forest will be traversed with thinning and pruning operations once in about fifteen or sixteen years, or perhaps less. Some requisite wooden and stone buildings were also erected during the year, and about 47 pounds of Eucalyptus seed were collected.

The season's planting commenced on the 28th of April, and ended on the 29th of July. The total areas already enclosed for planting and forest renovation in Wirrabara amount together to 1,847 acres. Into these enclosures 34,000 plants were transplanted from the nursery; of these, 1,690 Eucalyptus plants were transplanted, with their bamboo tubes. The numbers of each different species planted in Wirrabara were as follows:—

Pinus insignis,	Remarkable Pine	13,341
„ *halepensis,*	Aleppo Pine	1,320
„ *pinaster,*	Cluster Pine	5,747
Eucalyptus viminalis,	Manna Gum	1,430
„ *globulus,*	Tasmanian Blue Gum...	6,308
„ *corynocalyx,*	Sugar Gum	760
„ *marginata,*	Jarrah	580
Catalpa speciosa,	American Catalpa	406
Fraxinus excelsa,	English Ash	3,150
Ulmus suberosa,	Cork Elm	820
„ *campestris,*	English Elm	163
Acer pseudo-platanus,	Sycamore	41
Cupressus sempervirens,	Erect Cypress	4
„ *torulosa,*	Bhotan Cypress	2
Platanus acerifolia,	Maple-leaved Plane	3
		34,075

The stock of plants left in the nursery, comprising about 262,000 forest trees realised as follows:—

Open root	238,220
In pots	5,780
In bamboos	18,000
	262,000

In three of the enclosures the renovation of the indigenous forest is being accomplished by natural regeneration. It is estimated that in these; during the past year ,at least 5,000 trees have sprung up.

From the list of species planted it will be observed that the vegetation is of a rather sub-tropical character, and therefore, in comparing Australian circumstances with those of European forests, reference must be made not so much to England as to Spain, Italy, and the South. In the Mount Gambier Forest, in the southern district, *Pinus canariensis,* the Pine of the Canary Islands, and *Pinus pinea,* the Stone Pine, were also planted; the Stone Pine is characteristic of Naples and Sicily. The various kinds of Eucalyptus, or Gum, are cultivated with some difficulty near Rome and in Corsica. In Australia and Tasmania they are indigenous, and attain a gigantic height: in less than a hundred years; according to Mr. Guillemard, some specimens of these big trees have attained the prodigious lengths of 300 and 400 feet and more, and have surpassed in height the most gigantic Sequoias or Wellingtonias of California. In fifty years, if it is allowable to look so far ahead, the Gums lately planted may reach enormous proportions.

The produce raised in the nurseries is also used, some of it, for another purpose besides supplying the State Forest Reserves, and that is, the encouragement of tree-planting in the colony by private individuals. Plants from the nurseries are distributed gratuitously to farmers, squatters, and others, as well as to various corporate boards and committees who, in specified districts, are allowed to earn a bonus of £2 per acre by planting and raising trees according to certain regulations. In this way, during the year, were distributed to corporations, farmers, and others about 160,000 trees, which had been raised in pots, bamboos, boxes, and open root in the nurseries. Of those distributed during the previous year reports have been received, showing that there are now not less than 80,000 still alive and doing well.

This report leaves a general impression that the South Australian Government took very wise steps when they formed their Forest establishment seven years ago, and improved it more recently. South Australia has thus got a good start, and is ahead of many other colonies in the indispensable work of forest conservancy and development—work which will have to be attempted sooner or later in all parts of 'Greater Britain.'

ENGLISH ARBORICULTURAL SOCIETY.

AS briefly reported in last month's 'FORESTRY,' the second annual general meeting of the English Arboricultural Society was held on November 24th, in one of the ante-rooms of the Town Hall, at Hexham, when a fair number of members were present, including Mr. C. J. Bates, of Heddon and Langley Castle; Mr. T. P. Dods, Mr. Fell, and Mr. J. W. Robson, of Hexham; Mr. Wilson, of Greystoke; Mr. Dixon, Shotley Hall; and others.

Mr. Bates, who is one of the vice-presidents, took the chair, after which the minutes of the last meeting were read and signed. The names of new members were approved, and officers re-elected, with some additions made to the local secretaries.

The Treasurer (Mr. T. P. Dods) moved that the office of treasurer, which he held, be transferred to the secretary, as it would be more convenient and easier to conduct the business of the society if the two offices were united. This was approved by the meeting.

The financial statement was also approved and satisfaction expressed at there being a very fair balance in hand.

The reports of local secretaries were also heard. Mr. Wilson, of Greystoke, could not report very great progress in his neighbourhood, as foresters and others were widely scattered, and it was difficult to get them together for a meeting.

Mr. Clark, of Blenkinsopp, reported that two meetings had been held, and papers read in his district (viz., at Hexham) during the past year, and thought they were calculated to increase interest in the society.

The Chairman then addressed the meeting. He had hoped that he would not have been called to fill that position on that day, but their noble president, the Earl of Durham, had written the secretary that he could not be present owing to a prior engagement, and Mr. Howard was from home. But he was glad that he could congratulate the meeting that the society was now formed. At the same time he was sorry it had not received that support which might have been expected, and could only attribute the apathy manifested to a want of interest in tree-growing. Still, the support they had received was encouraging, and no doubt the further they went south the more they would increase. He was glad to say that in regard to the obtaining of information, and beginning practical discussion in this important science, a veteran forester (Mr. Clark, of Dukesfield) had given them the lead in that neighbourhood, and read the first paper to the society, and they would now have to begin actual work and do something to bring out the transactions of the society and make it known. Facts in connection with forestry ought to be sent in by the members as they were meeting with them in their every-day practical experience. He regretted that no outside meetings had been held and excursions made to places of interest in forestry, and considered they would learn most in that way by the practical exchange of opinion on the ground of the forester's operations. He thought also that local secretaries ought to send in accounts of planting and other important improvements, such as the planting of hills, &c., that might be going on in their different neighbourhoods, which were sure to prove interesting and useful to the society. In reference to the planting of hills, they might very likely have to wait a long time for a direct profit from such plantations themselves, but looking at the increased value of land by the shelter obtained from them, they would amply repay the cost, and experiments in this direction ought to be made. He considered the worst-managed trees on estates were those in hedgerows, but of course the hand of the agriculturist was generally against them, as they were looked upon as intruders and encroachers on his rights, and hindrances to his operations in many ways. But he thought hedgerows running north and south might be planted with advantage to the agriculturist if the proper kinds of trees were used. There seemed also a great want of Willow planting on the banks of rivers in the north, as it was a great protection to them from sliding and falling in. In conclusion, Mr. Bates remarked that now that the 'Agricultural Holdings Act of 1883' had been passed, proprietors would be doubtless concluding that there was nothing now left to them over which they could exercise their oversight and have their own way; but he was glad to say they still had their woods and plantations left to be cared for, and trusted they would now receive that amount of attention which they deserved, and that through the incoming year their society would help in developing that interest and make great progress as a society with such an important end in view.

After the Chairman's address, other business affecting the society was proceeded with, resolutions being passed that all local secretaries be members of council; and that the secretary have power to make arrangements for the publication of the transactions in some journal of forestry.

A paper was then read by Mr. J. W. Robson, of Bank Foot Nurseries, Hexham, entitled 'The Experimental Planting of Trees not generally known, or as yet not fairly tested in the North of England.' He said :—

Mr. Chairman and Gentlemen,—At a previous meeting of this society I gave my promise to read a paper before you at this general meeting to-day. I am exceedingly sorry that, through press of business, I have not been able to get up sufficient evidence to justify me in bringing before you the subject I intended, viz., the necessity of securing seeds from healthy trees, and in the case of Larch and Scotch Firs more especially (of native growth). But, although I am not prepared to bring this subject before you to-day, I will, with your kind permission, do so at some future meeting. The paper I purpose reading is upon 'The Experimental Planting of Trees not generally known, or as yet not fairly tested in the North of England.' There are several varieties that have come under my notice during the last few years which I feel confident would, if judiciously planted in suitable situations, prove valuable timber trees. One variety of which I have taken particular notice is the *Abies Douglassii*, or Douglass pine; this tree was discovered in 1797 in Noodka Sound, by Menzies, who accompanied Captain Vancouver on his voyage round the world, and afterwards by Douglass, in 1825, who found it growing in immense forests in North-west America, between 43 degs. and 52 degs. north latitude. Within these limits trees of 10 ft. diameter, and from 100 to 180 ft. in height, were observed, and he mentions the stump of one upon the river Columbia, which, exclusive of the bark, at

30 ft. from the ground was of the enormous girth of 40 ft. The same traveller speaks of the wood as being firm, heavy, with few knots, of a yellow colour, and not in the least liable to warp. This tree has of late years been extensively planted at Alnwick Park, where it does remarkably well. It seems to answer best on the lower grounds and denes, and in almost any soil, if dry, but does not do so well upon the higher lands, as the tops, when tender in early summer, are liable to be broken by the winds. One tree in this park has attained a height of over 80 ft., and measures 7 ft. 8 in. in girth at 4 ft. from the ground. This tree has been planted about fifty years. Another group were planted fourteen years ago on loamy soil. The best of these are now 35 ft. high, with a girth at 1 ft. from the ground of 36 in. The next group, planted twelve years ago, on gravelly soil, are now 30 ft. in height, with a girth at 1 ft. from the ground of 30 to 33 in. The average yearly growth of these will be about 3 ft., and they look healthiest on a north aspect. Selby mentions a specimen at Jardine Hall, Dumfriesshire, which, planted out as a seedling, in fourteen years attained a height of 25 ft., with a girth of stem at 1 ft. from the ground of 2 ft. 9 in. The growth of the leading shoot in one year measured 4 ft. This tree is planted on light gravelly loam. But many young trees of this variety when planted on the outskirts of plantations, or on very exposed places, suffer heavily with the winds. I have very rarely found them doing well on high situations, one exception being at Whitfield Hall, where there is one fine specimen growing at a high elevation. Many suffered severely from the frost in the winters of 1879 and 1880. But I think that, if the situations on which they are planted are selected so as to suit the constitution of the tree, they may be considered hardy. *Abies grandis* is a native of Vancouver's Island, where it attains a great size. This variety is also well worth attention, and to the best of my knowledge it is perfectly hardy in our climate. I have never yet found it in the least affected by frost. It grows very rapidly, making young shoots of from two to three feet in one season. This tree in its native country equals *Abies Douglassii* in hugeness of stature. But of the quality of its timber I am not able to speak, as I have not seen any of it cut up, and have no reliable information on the subject. Another splendid tree, to which I wish to call your attention, is *Picea nobilis*, one of the finest of our ornamental conifers. There are a few fine specimens of this grand Pine in our immediate neighbourhood, notably at Duke's House, the seat of Mrs. Backhouse, and at Sandhoe, the residence of Hugh Fenwick, Esq., also near Hexham. I have here a fine cone from one of the trees growing at Sandhoe. But I am sorry that either from the absence of male blossom, from unsuitable

climate, or other causes, these cones this season contain no good seed. This tree is a native of the north-west of America and the regions which bound the Northern Pacific Ocean, is thoroughly hardy but slow in growth in its earlier stages, but when it once becomes established in a suitable soil and situation its growth is vigorous and rapid, its fine glaucous-green foliage making a striking contrast when mixed with other trees. A group of *Nobilis* planted at Alnwick about thirteen years ago are now 24 ft. high. *Picea nordmanniana* (Nordman's Silver Fir), a native of the Crimea, I believe—this tree is in my opinion the finest type of the Silver Fir. In fact, Mr. Coxon, head forester to his Grace the Duke of Northumberland, argues that the large Silver Firs in Alnwick Park, one of which fell during the heavy gale in the October of 1881, and measured 1,000 ft. round measure, or 600 ft. when squared, are the true *Nordmanniana*. To test this, we had a branch taken from one of these old Silvers and placed among the branches of a young *Nordmanniana*, where it could not in any way be distinguished from its younger relation. I have not seen any large specimens of the fir which is sent out as *Nordmanniana* but from its sturdy, vigorous growth it will not be many years before large specimens of this fine tree will be common enough. It seems to have this advantage over the common Silver Fir, that it stands wind better and will grow on more exposed situations. Another species deserving of more extended cultivation is the *Pinus laricio* (Corsican or Larch Pine), which, though inhabiting a lower zone than the *Pinus sylvestris*, is sufficiently hardy to thrive in any part of Great Britain, except the more elevated mountainous regions. It is a tree of handsome form, the leaves long and slender, and of a deep green. In Corsica it is said to attain a height of 140 to 150 ft., but its general height may be stated at from 80 to 100 ft. Its growth in a favourable soil—a dryish, gravelly, or sandy loam—is much more rapid than that of the Scotch Fir, its leading shoots often making a growth of 2 ft. There is an instance on record where two plants, one of *Pinus laricio* and one of *Pinus sylvestris*, were planted together at the same time and at the same age. In the course of eight years *Pinus laricio* had attained a height of upwards of 12 ft., and *Pinus sylvestris* of not more than 7 ft. Its timber, although inferior in elasticity to the common Pine, is of greater specific gravity, and by the French has been extensively used in shipbuilding as well as for masts of vessels. It is also in request with cabinet-makers, and works easily and smoothly under the plane and chisel. It is a native of Corsica, and also abounds in the Caucasus, and in the south of Russia and on the loftier summits bordering the Grecian Archipelago. It has one advantage over most of our forest trees, that when young it appears to be quite impervious to the attacks of ground game. The principal difficulty with it is the danger of bad takes in planting, as if allowed to stand too long before transplanting it becomes bare-rooted and difficult to get to strike. But I find that a perfectly safe way of dealing with the Corsican Pine is to leave the planting of it till all the other trees are in the ground, and then, when the top buds have made a start of about half an inch, to begin planting, and by following out this plan we have been quite as successful as in planting Scotch Firs. Another plan is to transplant frequently, so that whenlifted for permanent planting each plant will carry a ball of earth. This is a safe but more expensive way. *Pinus cembra* (Swiss Stone Pine) is very similar in appearance to Corsican Pine, but finer in its foliage and more compact in its growth. There are several fine specimens of this tree also in Alnwick Park, where it grows well, but not so rapidly as some of the varieties already mentioned. This Pine when at a great age forms a vast canopy of branch and foliage, and supported upon its naked column of great height forms one of the chief beauties in the splendid landscapes of Claude Loraine. There are many other varieties of trees, both coniferous and deciduous, to which I should like to call your attention at some future time, but for the present I must ask your kind indulgence for the hasty manner in which this subject has been treated. But I firmly believe that from experimental planting much good may come. By experimental planting we obtained the Larch, and by following out experiments in the same direction we may discover merits in other trees which in the future may cause them to supersede this valuable but delicate timber tree.

The Secretary had great pleasure in moving a vote of thanks to Mr. Robson for his paper. He was glad such a paper had been read, and read by a nurseryman, as it was a very puzzling question at the present time to know what kind of trees to plant that would suit both altitude, soil, and climate, and there were very many, no doubt, among those that were mentioned by Mr. Robson that were suitable, but the cost of them, as plants, was such a very serious item that they could only be planted in very small quantities; but, as they had them recommended by a nurseryman, he was best calculated to help them out of that difficulty.

Mr. Wilson, of Greystoke, seconded the motion, which was supported by the Chairman, and heartily carried; after which some discussion took place as to the proper kinds of Pines to plant is exposed situations.

A very hearty vote of thanks was then given to the Chairman for presiding, and for the great encouragement he had given to the society, after which the meeting terminated.

ESSAYS AND REPORTS FOR THE INTERNATIONAL FORESTRY EXHIBITION.

THE Committee in a recent circular announced that Concise Practical Essays on the subjects enumerated below would be much appreciated, and would assist the labours of the Jurors and Reporters.

Systematic Collections of Forest Produce, specially illustrating the sources of Supply and the methods of Manufacture in different Provinces, with accompanying Reports, are solicited.

Any such Reports or Collections must be forwarded direct to the Secretary on or before 14th June, 1884, and they will be immediately acknowledged and referred to the several Sections.

Diplomas, Medals, and Money Prizes will be awarded on the recommendation of competent Jurors.

Subjects of Essays and Reports.

1. On the Formation and Management of Forest Nurseries.
2. On the Formation and Management of Plantations in various Sites, Altitudes, and Exposures.
3. On the Present and Prospective Sources of the Timber Supplies of Great Britain, with Statistics of the various descriptions of Timber imported during the past 25 years.
4. Report, with Specimens, of any Hardwood likely to supply the place of Boxwood for Wood-engraving.
5. On the Afforesting of Mountains and other Waste Lands, with details of the method adopted and the results obtained. To be accompanied with Drawings, Photographs, or Models.
6. On the Effects of Forests on Humidity of Soil and Climate, from personal observations made by the author in any Country or Locality.
7. On the Treatment of Coppice and the Utilisation of Branches and Fragments of Forest Produce, with the view of diminishing waste.
8. On the Growth and Management of Eucalyptus Plantations, and their economic uses.
9. On the best Method of preventing erosion of River Banks, with Illustrations.
10. On the comparative advantages of the various Methods of producing and harvesting Cinchona Bark, with Specimens.
11. On the ravages of Tree and Timber destroying Insects, with Specimens and Illustrations.
12. On the ravages of Mollusks and other Marine Timber-destroying Animals (excluding Insects).
13. On the Destructive Influence on Wood of Fungi and other Plants.

14. On the Supply of Teak Wood for Ship-building purposes.
15. On the Utilisation of Forest Produce in the Manufacture of Paper.

The Executive Committee are anxious to obtain Reports on the Forest Productions of our own Crown Colonies, or Foreign Countries, accompanied by Specimens. The Secretary is Mr. George Cadell, 3, George IV. Bridge, Edinburgh (late of the Indian Forest Department), and the Offices are at 3, George IV. Bridge, Edinburgh.

LECTURE ON ENGLISH FORESTS.

ON the evening of Tuesday, the 11th December, Mr. Paterson, of Hunstrete, delivered a lecture to an appreciative audience, in the Town Hall of Farnborough, in aid of the funds of that Institution. The subject of the lecture was 'English Forests, with their Historical and Legendary Associations.' The lecturer introduced subject by interesting remarks upon forests in general: trees and their his beauties; and the influence of forests upon the mind, in the varying seasons of Spring, Summer, Autumn, and Winter; primeval forests in the uninhabited parts of the world, and their uses from the early stages of civilization to the present day; mentioning many interesting particulars regarding the old Forests of Windsor, Epping, Dean Forest, Dartmoor, the New Forest, and the forests of the middle and north of England, with many of their historical associations, and stories of their legendary lore.

The chair was ably filled by the Rev. Henry Cooper, M.A., Rector of Farnborough, who cordially endorsed many statements of the lecturer, and was awarded a hearty vote of thanks from the lecturer and audience, for so ably and kindly presiding over the meeting.

The Fate of the Canadian Forests.—The Government of Ontario has caused to be prepared an elaborate report on the state of the forests of the province, which comprises an account of what is now being done to preserve forests in other countries throughout the world, together with much practical information on the subject of forest management. The report gives a lamentable account of the reckless destruction of forests in Ontario, and predicts that unless powerful efforts be made in the direction of replanting, the cultivated portions of the country will ere long become denuded of trees, since experience shows that isolated patches of forest left standing will not, without care, continue many years in a state productive of timber, or, what is still more important, beneficial to the climate. That other Governments are alive to the supreme importance of the climatic influences of forests is abundantly showed in the report. It appears that as far back as the year 1696, the attention of the French Governors was drawn to the wasteful destruction of the Canadian forests, and they were called upon to check it. 'Nothing, however,' adds the report, 'was done by them, and little has been done since.'—*Daily News.*

ENGLAND.

THIS, the first month of the year, is generally the coldest throughout the year. The westerly winds, which usually carry with them some of the mild influence of the Gulf Stream, are about this time frequently replaced by easterly and northerly currents, which bring with them some of the rigours of the icy north, filling up our woodland paths and drifting up our hollows with snow. The quantity of rain which falls is subject to great variation, and is generally greatest when westerly and south-westerly winds prevail, approaching to about 3½ inches; whilst the evaporation during the month only amounts to about half an inch.

ORCHARD.—Fruit-tree planting should be pushed forward as fast as the ground can be prepared for the trees, and the weather suitable for planting. Should the subsoil be stiff and wet, drains made between the rows of trees may prove of great advantage, as a cold, retentive, undrained subsoil is most unfavourable for the healthy development of the plants. Continue the pruning of orchard trees, and also gooseberry and currant bushes. Draw the earth away from the stems, and from under the gooseberry and currant trees after pruning, and bury it in the centre between the rows, from which fresh soil may be taken to replace that scraped away. This proceeding is in some measure a preventive of the production of caterpillars.

WOODS AND PLANTATIONS.—Planting should be pushed on as the weather and circumstances will permit, so that little of this work should be left for completion in the following month.

Cut down underwood, and shred out coppice woods; and also proceed with ordinary thinning and pruning, but in pruning avoid cutting live branches from Firs, Larches, and Pines. The lower or dead branches should be carefully removed. The dead branches of the larch are best removed by striking them smartly with a stick or other blunt instrument close to the bole of the tree; this causes the branches to snap off close to the bark, and often within the external line of the bark, so that the wound soon heals over, and the timber is not deteriorated for useful purposes.

PRUNING.—I perceive in last number of 'FORESTRY,' page 149, 'A Tourist' takes notice of some remarks I made about pruning in the number for August, and asks a question about the pruning of large branches from trees. I am not an advocate for the amputation of large branches from trees of any kind, as I believe such an operation to be both injurious and unsightly; and, in a case such as 'Tourist' mentions, I consider the operation would be both in an eminent degree. Instances occur where trees have been planted for effect more than for profit, and from their early and constant training having been neglected, the heads have grown wildly out of proportion and symmetry, and probably encroached upon something, such as road or fence, that necessitates the curtailment of their dimensions. Such an operation requires to be conducted with great care and judgment to preserve the symmetry of the tree, and show as little as possible any marks of tree operation to a casual observer. In such cases as this the amputation of largish branches is sometimes necessary, and the effect will be to deteriorate the value of the timber for useful purposes; but as the trees are to be retained for effect, and are not grown for £ s. d., such pruning has a meaning and value peculiar to itself, and cannot be put into comparison with pruning done for the production of useful and valuable timber.

I have observed that live branches amputated in August, while the sap is in active circulation, soon have a small ring of new bark formed around the edges of the wound, and circling over upon the wood, thereby excluding external wet from soaking in between the bark and wood, to cause decomposition and prevent the speedy healing of the wound. The painting, or, preferably, the tarring over the surface of a wound made during the winter months, or at any other time, tends to prevent water from lodging under the bark around the edges of the wound, and facilitates the first process of healing in the spring.

FENCES AND DITCHES.—Repair all wood and iron fences and dry stone walls; cut, plash, and lay thorn and other ditches. Clean out ditches, and keep all water tracks and courses clear of any obstructions to the even flow of their waters.

NURSERY.—In dry and open weather, push on and complete the sowing of all kinds of seeds that were kept in pits during the summer. Also sow acorns and chestnuts, and insert cuttings of deciduous plants. Collect cones of the Larch, Scotch Pine, and Spruce, and store away dry until the season for sowing. It is important to see that the cones of the Larch are thoroughly dry before storing away.

Ground that has been frequently cropped is greatly improved by receiving an occasional coating of clean fresh soil, and when this is applied early in the winter its effects are more markedly apparent.

The Hawthorn being an early springing plant, it should be transplanted both into hedges and nursery rows before the buds expand.

PLEASURE GROUNDS.—Clean up all fallen leaves from the lawns and pleasure grounds, and from corners or hollows into which they may have been blown, removing them to the depôts as collected, to prevent them being re-blown over the ground. Turn over last year's leaves and dung heaps, and turn and mix the heaps of compost.

A. PATERSON.

Hunstrete, Pensford, Bristol.

SCOTLAND.

THE work of the month will depend to some extent upon the state of the weather. In general, the recommendations of last month may be continued. Prosecute the thinning of woodlands where this is necessary, depositing the thinnings in roads convenient for removal as the work proceeds.

Thin, fell, and remove hardwood timber, except lots of Oak, where the barking of it will be remunerative.

Cut and manufacture supplies of timber for estate purposes, and make up faggots and cut billets and firewood for home use.

Cut back or rib in, and make up all overgrown Hawthorn hedges. The cutting should be neatly executed, and always in an upright direction.

Dig nursery ground, and transplant during favourable weather. If favourable weather, sow seeds of Holly, Hawthorn, &c., which have been in pits during the summer. Insert cuttings of deciduous plants, and collect Scotch Fir and other Pine cones. Execute ground work improvements, and complete necessary repairs in roads.

In last month's notes, instead of 'line' read *low*, and of 'peeling' read *felling*.

D. SCOTT.

Darnaway, N.B.

IRELAND.

CONTINUE the thinning of young plantations and the felling of large trees in fields and about the policies. Remove the cut timber as soon as possible, especially whatever is lying in the fields and has to be carted through them. All cutting of hedgerow trees ought to be completed before the end of this month, and removed without delay to somewhere outside the field. All hedges should be splashed and trimmed where necessary, and gaps filled up. If thick, close, serviceable fences are desired, this work should never be delayed beyond the end of the current month.

All ground operations, such as drainage and road-making, should be forwarded with every energy, as agricultural work will soon occupy such hours as may have been employed from the farm. The same remark applies to repairing of avenues, gravelling walks, and the carting of road metal. While the weather is open, push ahead with planting in the nursery: there is nothing equal to early planting of seedlings. If a fine stubby growth is desired, the plants should be one-year seedling Larch, and two-year seedling Scotch Fir, planted in rows of eight or nine inches apart, to admit of an easy hoeing when clearing during the summer. All plants should have plenty of room to finish well out in the nursery, and where such is the case they always turn out healthy and strong when the time comes for planting *in situ*.

D. SYM SCOTT.

Ballinacourt, Tipperary.

WALES.

THE open weather and absence of frost during the greater part of the past month have been favourable for planting light and dry soils in sheltered situations. On the other hand, the severe storms of wind and rain have been more or less against planting stiff and tenacious soils in exposed situations. Ground of a clayey or stiff nature should not, if possible, be planted during wet weather. During favourable weather and like circumstances the planting of forest trees may be continued; also the preparing of ground for planting in the spring by fencing, clearing, draining, and any other necessary preparations of the soil to receive the young plants.

Continue the thinning of plantations and the cutting of underwood; also the felling of hedgerow and park trees (Oak excepted), and, if possible, finishing up during the present month. Continue as last month the binding of faggots, and prepare other firewood for sale or home consumption as demand requires. Remove timber and other plantation produce during frosty and dry weather.

Keep fences of all sorts in good repair, and attend to rabbit-proof netting. Trench and prepare sites where it is intended to plant young hedges in the spring.

Continue to attend to evergreen and ornamental trees and shrubs during snowstorms, and see that their branches are not weighed down and broken by the snow.

Where large trees and shrubs have lately been removed, it will be necessary to see to their stakes or moorings. Where not already finished, no time should be lost in repairing roads and walks by stirring and gravelling, which should be well rolled in. Where ground has been cleared by the removal of plants from the nursery, it should be well trenched and turned up during fine weather. As time and weather permits, fill up with young stuff all vacant ground that has been well manured and cleaned.

LEWIS BAYNE.

Kinmel Park.

SALE OF ENGLISH TIMBER.—Messrs. Rogers & Hamar held a sale of timber grown on the Rotherwas Estate, Hereford, on Dec. 6th, when the prices fetched were satisfactory. There were thirteen lots, consisting of oak, elm, ash, and larch trees, coppice wood, &c., the total amount realised being £1,673 10s. The chief buyers were Messrs. Groom & Sons, Wellington; Jones & Sons, Llangunider; Barker, Shrewsbury; Connell, Hereford; and Higeon & Jones, Llangollen.—*Timber Trades Journal.*

ENGLISH GIANT OAKS.—In an article by Mr. W. Senior in Cassell's 'Picturesque Europe' on 'The Forest Scenery of Great Britain,' he states that at Welbeck there is the Greendale Oak, an oak estimated to be by one authority seven hundred, and by another one thousand five hundred years old. This oak is probably the Methuselah of his race, although it may be noted that there are few forests which do not, through their local historians, advance plausible claims for a like distinction. The Greendale Oak, nearly one hundred and fifty years ago, was deprived of its heart by the eccentric desire of a former owner to make a tunnel through the trunk. This novel piece of engineering was effected without any apparent injury to the tree; an opening was made through which the Duke of Portland drove a carriage and six horses, and three horsemen could ride abreast. This arch is 10 ft. 3 in. high, and 6 ft. 3 in. wide. A cabinet made from the excavated oak wood for the Countess of Oxford is one of the curiosities of Welbeck Abbey (the seat of the Duke of Portland). It is ornamented with a representation of the grand old tree, which is now shored and supported against the elements, before which it must erelong succumb. The Spread Oak of Thoresby extends its arms over 180 feet of ground, and can give shelter to one thousand horsemen. In the hollow of Major Oak seven persons have dined with comfort, and that is of course impossible without unrestricted elbow-room. This tree is remarkably perfect in form, the true type of a sturdy oak that is still prepared to brave the battle and the breeze. The Parliament Oak is a more decrepit patriarch of Sherwood Forest; it is supported by friendly artificial aids, and its trunk is now split in twain—symbol, it might be said, of the Government and Opposition, which are the life of the system whose name it bears.

EDITOR'S BOX.

PLANTING TREES AFTER AN OAT CROP.

SIR,—I am intending to plant a piece of land, which has had a crop of oats on it this summer. The land is 500 ft. above the sea, thin and bare, on the chalk. Can you or any of your correspondents tell me whether it is best to lay such land down to grass before planting or what I should do with it? My experience is that trees, especially Larch, do not do well on such land as I have described, after a corn crop.

A. J. CHOLMLEY.

Newton, Billington, York.

BARBED FENCING.

SIR,—Will any of your readers kindly give their experience of the American patent barbed fencing wire? Since its introduction I have looked upon it as a barbarous contrivance, very dangerous to stock; as I have known valuable horses cut themselves severely upon a joining of the wire where the ends had been left too long. However, as fences are often much damaged through stock rubbing against them there is no doubt but that the barbed fence would be an acquisition if there is no risk of injury to stock.

QUERIST.

KAY'S DENDROMETER.

SIR,—I am glad to be able to bear testimony to the accuracy and simplicity of this instrument for taking the heights of standing trees

I had occasion a few days ago to have a very tall Lombardy Poplar taken down which stood in a very favourable position for estimating the height. The tree was ninety feet in length when laid on the ground, and I got the height to within six inches by means of the Dendrometer, before the woodmen laid an axe to its roots. The day was rather windy at the time, which rather disturbed the plummet; otherwise I had no difficulty whatever in taking observations from two standpoints.

W. B. H.

THE GALE.

Sir,—A great deal of damage has been done to the woodlands on the Duncombe Park Estate by the gale which came on about ten o'clock on Tuesday evening, the 11th December. In the Home Terrace, Park, and woods adjoining, upwards of 150 Beech, Elm, Ash, Oak, &c., have been uprooted; whilst in the extensive Fir Plantations, fully 3,000 Scotch and Larch Trees, most of them of large size, have succumbed. One remarkable effect of the storm is seen in the great number of Scotch Fir snapped off at from ten to twenty feet above the ground. The wind was at its height between two and four o'clock on Wednesday morning, and was blowing from the north-west, but it fortunately moderated towards daybreak. I am of opinion that it was quite as strong as either of the gales of 1880 or 1881, but that as the leaves were off the trees this time the woods—at any rate on this estate—have not suffered to the same extent as they did on the previous occasions. We foresters can only hope that the present low prices of timber will not be still further reduced by so much timber being rushed into the market at once.

W. B. H.

LEAF CANOPY AND PRUNING.

Sir,—Under this article in your December issue, and in 'Suppression of Branches under Shade,' in that of October, by 'N. N.,' are to be found a great amount of valuable and suggestive matter well worthy of your readers' careful consideration; but he makes two remarks which appear so very striking that it might be interesting to know something more about them.

Firstly. He says: 'In some rare instances, under very dense canopy, cases have occurred, particularly in Beech woods, where the deposit of leaves, almost knee-deep, was so excessive as to become injurious.' Will 'N. N.' be so good as to tell us how this injury was discovered to be due to the excessive depth of leaves, and to no other cause?

Secondly. He says: 'This would easily be corrected by bolder thinnings. Letting a little light in on the leaves would soon rot them, and stimulate the stagnant growth of the Beeches.' A forester has got an immense quantity of Beech leaves lying about his drives, near to some dense Beech woods. He collects some for bedding for his horses, which he takes to an open, airy, sunny place, and dries them much in the same way as a farmer would his hay. He then stores them past in an open dry shed, into which sun and air have free access, *but no rain;* and what he does not need of the leaves found about his drives he collects and puts under some trees out of sight, where they have a deep shade over them. If those in the open dry shed will last for years without undergoing any appreciable decay, while those in the damp shade are fast decaying, simply because the one is dry and the other damp, would bolder thinning and the letting in of light not lead to drying up the leaves and preventing decay, rather than accelerating it?

D. M'CORQUODALE.

Dunrobin, Golspie, N.B.

FOREST ROADS.

SIR,—The burning question among foresters is, Who is 'Loanleah'? For a number of years I have had some experience in planting: trees planted among heather, as a rule, always succeeded; those among grass (unless pared) always died, not so much from being choked as from want of moisture; but if planting on grass soil (without paring) is a satisfactory mode of increasing demand on nurseries, the indiscriminate cutting of grass among plants by parties interested only in the grass will prove a most successful wholesale clearance for two, three, or ten replantings. Your interesting correspondent is no less wonderful in engineering. It is on poor ground where plants do not thrive that roads are to be made; then, as a matter of course, all gravelly hillocks will be turned into roads, minus outlets, unless stinted plants point the way. This beats General Wade, who, in order to keep his roads straight, went right over hill and dale. It seems Mr. Scott has been planning his roads when the ground was bare, in order that he might better see the line for future locomotion It is now to be hoped that he may profit by this new mode of timber transit, which I suppose will be by balloon.

I do not write this in order to extricate Mr. Scott from difficulty, as he can do so himself if inclined; but he may rest assured that north of the Tweed his opinions on forestry are regarded as high authority.

Should your correspondent cast aside his *nom de plume*, I may again revert to this subject; but as in the meantime he is only known as 'Loanleah,' I feel justified in adopting the respectable designation of TAMAS.

Stanedike, Forres, N.B.

SIR,—With the remarks in 'Forest Work' (for October) of Mr. D. Scott—at page 67 of 'FORESTRY'—I quite concur concerning the planning and leaving unplanted of all the main roads in all extensive forest enclosures. I acquiesce in those remarks for obvious reasons; and in briefly stating these reasons, I will not undertake to answer Loanleah's 'query' (his knack of economy and finance appears exquisite in the habiliment of a query), but will assay to manifest the foresight and discretion of Mr. Scott's remarks. In my opinion, then, it is desirable to have all main roads in a plantation planned and marked off prior to planting, because whilst the ground is nude and unplanted, the place of the roadways can be better seen and traced; and therefore, whether the ground be steep, rough, flat, undulating, or whether the roads have to wind about among small hills, traverse the sides of hills, run obliquely, run vertically, or traverse a level plain—no matter which, it is much easier to plan advantageous roads before planting than after; nor, in doing so, need the best soils be utilised.

Now, allowing wood roads to be five yards wide; then, for the sake of argument, imagine a forest in which there are eight miles of such roads; that is, within a small fraction of fifteen acres. Let us call it fourteen acres, and, as 'Loanleah' seems to plant his trees about three feet apart, it will require 4,840 trees to the acre, and 4,840 × 14 = 67,760 trees, to plant the eight miles of roads, which I will suppose costs the small price of nine shillings per 1,000 for plants and planting, or about £2 3s. per acre, or rather more than £30 for the eight miles of road, all of which unessential outlay 'Loanleah' ignores. Being full of the Utopian idea of again getting all of these thousands of trees when they are two or three feet high to transplant at £2 per 1,000—all other economy is obscured by the radiancy of that. Such a vision is too brilliant to quit the stage of incidents still-born. But what I would respectfully ask Loanleah' is this: Is he going to plant these thousands of plants after all ? for I would take it that they are to be taken from the poorest soils of the plantation, and withal will not be, I suppose, very healthy, nor for that reason very fit subjects to plant anywhere.

In planning roads through woods it is most important to place them in such a manner as to necessitate the least possible expenditure, and moreover to absorb the smallest possible amount of making : this is, of course, subordinate to sufficiency. Roads, wood-roads, should not cost anything like £200 per mile if judiciously planned ; and roads can never be more judiciously planned than previous to the planting of the ground.

On uplands roads should run along the broad side of hills, never perpendicularly to the slope ; and if cross-roads are indispensable—which they may be, either as shooting rides or as more suitable means of easy transit of the crop—these cross-ways should lie obliquely to the steep, with a bias of not more than thirty degrees.

Another reason why roads should be left unplanted at the period of planting is that most proprietors take pleasure in riding or walking through their woods ; and the forester who does not anticipate such a thing is rather blind to the general desire of most woodland proprietors. The best time for the making of such roads may be a subject of contention ; but, in my view, the best time for such operation is at any time during the series of thinnings, which is the consequent of planting. In the time of snow or much rain, when men could not thin in young plantations in bad weather, how approximate is a necessary part of forest work that might be advantageously and economically advanced.

But this matter of forest roads would exhaust greater discussion than space or time allows. And, in conclusion, I may be permitted to express an opinion concerning planting without particularizing. In brief, wherever there is superabundance of herbage, of heath, grass, or any other vegetation, it is cheapest and best to get plants to suit the conditions. On heath land, if the heather be burned from four to six years before planting, planters will find such land in the best possible state for planting ; and on rough grassy land, strong plants with good fibrous roots are doubtless best, and best economy.

SYLVESTRIS.

SIR,—In answer to 'Loanleah's' letter, on page 148 of your last issue, in reference to Mr. Scott's instructions as to paring off the surface of grassy ground before the plants are inserted, I have no doubt that all experienced foresters will agree with Mr. Scott. The principal reason, as I think, in favour of paring, not only grassy, but also heathery ground, is that when the surface is pared the roots of the plants have a far better chance of being effectively covered when put in by notch-planting than they would if the grass and heather were left on the spot where the plant was to be inserted. 'Loanleah,' in the case he supposes, says that it would take as much time to plant ten in the grass as it would to plant one hundred in the heather.

With this estimate I cannot agree, even should the grassy ground be stony, as he supposes. I have found by experience that a labourer will insert more on grassy ground than he will on ground that is covered with heather, as I always found that it was much easier to pare ground that was only covered with grass than pare that which was covered with rank heather. I had the planting of about four hundred acres of hill pasture a few years ago, a good part of which was covered with strong heather, and the rest with short heather and grass. In both cases I removed the surface; and, in going to see the plantation after two or three years' absence, I found that the plants in the part of the ground that was covered with heather had made better growth and looked stronger than those on the grassy part.

In regard to 'Loanleah's' alternative mode of planting in irregular rows of three-and-a-half feet apart and two-and-a-half feet between each plant, it may be objected that more plants would be required per acre, and that the regular thinning would thereby become a much more difficult process. It is much better to plant at regular distances, say three or three-and-a-half feet apart, which is thick enough on any hill pasture, unless operations are carried on to a high altitude, when the plants would perhaps require to be put in even at two feet apart.

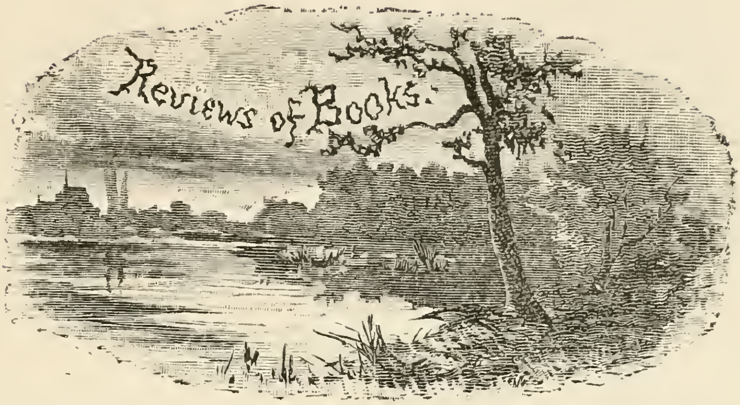
This mode suggested by him assumes that people would be glad to clear the plants for nothing if they got the grass. 'Loanleah' must surely refer to hill pasture, which must be very uncommon, or to land at one time under cultivation, before it would pay any person to clear away the grass, even though they did get it for their trouble. He might get his plan to work well enough where the grass was accessible in a small enclosure, but it would utterly fail in a large plantation on hilly ground. Besides, I have no hesitation in saying that many plants would be destroyed however carefully the grass was cut and collected. Altogether there is no doubt that 'Loanleah' will find it to his advantage and profit to follow Mr. Scott's instructions.

The roads suggested by the latter are not necessarily the elaborately finished drives estimated at such a high expenditure by 'Loanleah.' No practical forester would think of such an expensive road for forest purposes as 'Loanleah' supposes. A roadway roughly levelled with the turf cut along its own track would sufficiently serve three good purposes, viz.: 1, cartage; 2, shooting passes; and last and not least, to serve as effective breaks to stop the spread of a possible fire. No doubt drains are highly necessary in some grounds, but these should be finished before planting is begun, so as to have the ground in good dry condition to receive theplants. 'Loanleah's' other supposed plan in regard to roads is open to objection on the score of unnecessary expense and trouble. He proposes to plant his intended road, and then to lift his plants and transplant them where necessary. In the course of three or four years this might suit where immediate cover is required, otherwise it would be cheaper to purchase his plants from the nurseryman to plant where necessary, and let his roadways be unplanted. Besides, after he had acclimatized his plants on the site of the road, the part on which the plants did not grow so well, might be quite unsuitable for making a road that would be of any service save for shooting purposes, so that on the route he would by the nature of the ground be compelled to take, he would root up as many good plants as bad ones and if 'Loanleah' did follow the part of the plantation on which the plants did not grow so well for the site of his road, he would no doubt have a shooting pass. Then in the event of this pass not being suitable for carting, he would at the end of twenty years have to make other roads for carting purposes, which would be more expensive than if he had marked them off first, and saved the trouble of planting and transplanting as suggested by him.

Assuredly in this case also 'Loanleah' should follow the plan approved by Mr. Scott, and I think he will find it to be the most economical. And if he puts the two methods to the test of experience, I should be very glad to hear the result. M. B.

* * *

THE DECEMBER GALE.—Great damage was done in Scotland during the recent gale which raged in the north on the 11th of December, occasioning many wrecks and loss of life. A number of trees were blown down in the gala policies, Selkirk, and in Fifeshire, in the Markinch district, stacks were toppled over and scattered, roofs of houses were stripped and chimney-cans broken. The woodlands bore ample evidence of the force of the storm. In Balbirnie, Balgonie, and Balfour woods large trees were torn up by their roots, while others were broken over half-way up their stems. In many places the roads were blocked up by wind-tossed trees. This was the case near the Cameron Bridge Station of the Leven and East of Fife Railway, where a huge ash lay right across the road, putting a stop to all traffic for a time. At the same time the telegraph wires were broken down, stopping all communication. In Roxburghshire much damage was done in Hawick. The plantations in the vicinity of Hawick suffered severely. At Ormiston, a short distance from the town, the well-stocked woods have all been damaged more or less; while the Duke's wood and Kaimend plantation present a woeful picture. Here hundreds of tall Larch Fir, and Spruce trees have succumbed to the strength of the gale. In consequence of trees landing on the public highway, considerable obstruction to traffic was experienced. In Kilmarnock the storm caused great damage to property, and many trees were uprooted, and an engineman was killed at Hurlford by a falling tree.



The Merry Adventures of Robin Hood of Great Renown, in Nottinghamshire. Written and illustrated by Howard Pyle. London. Sold by Sampson Low, Marston, Searle, and Rivington, 1883.

This quaintly illustrated but withal handsome volume ought to find, as it doubtless will, a large public anxious to secure an old favourite in a new dress. Most of the illustrations—and there are a large number—are full-page, but there are a number of capital head-pieces drawn in the same quaint style as the larger woodcuts.

No good literary artist who attempts to build up the structure called 'fiction,' leaves out the elements of humour which should be in every story: and it is essential to the success of all work which portrays life, that the comic as well as the serious side of the subject should be presented to the reader. Apart from the absorbing interest of the records of the famous Robin Hood's adventures, they are intensely amusing; and the illustrations in the goodly tome under review have at times a 'Punch and Judy' character quite in keeping with the fun of the narrative.

We need only add that the text is beautifully printed, the paper of especially good quality, and the whole volume one to be cordially recommended.

Adventures of Robinson Crusoe. By Daniel Defoe. With twenty coloured illustrations. London: T. Fisher Unwin.

Here is another handsome presentation book—we had almost said a 'companion volume' to the one just noticed. But it differs in this, that, though an old favourite, its pictorial embellishments are coloured.

They too, like the illustrations in Howard Pyle's *Robin Hood*, have a touch of humour about them, but they are capitally executed, and the handsome volume which they adorn will surely, with its excellent and attractive cover, clear bold type, good paper, and gilt edges, delight many a boy and girl. There is such a numerous army of young people continually coming into the world, learning to read, and getting an appetite for the famous narratives which have delighted so many bygone generations of youngsters, that there will, we are sure, be a large constituency of buyers ready to purchase this handsome edition of dear old Robinson Crusoe. Mr. Fisher Unwin has joined the publishing ranks with a remarkable stock of enterprise, and if he continues to give us such good books as he has been lately producing he may be assured of continuous success.

Our Friend the Dog. By GORDON STABLES, M.D., ETC., London: Dean and Son, 160A, Fleet Street, E.C.

THE title of this book, its general plan, and indeed almost every sentence contained in it, leaves an impression on the mind that its author is a true 'friend of the dog,' and has evidently devoted so much of his time to the study of his habits, comforts, and utility that he is fully entitled to write a book about him, and to have it read with respect. Our readers will gather the best idea as to the scope of this book, and [most easily form their opinion as to whether it is likely to

CHAMPION ST. BERNARD MASTIFF 'SAVE.'

be a useful book for them, if we tell them as briefly as possible what it contains. The earliest chapters are devoted to the management and treatment of dogs in a state of health, their kennels, bedding, washing, food, &c., and the author's advice on these most important subjects is summed up in the three words—regularity, cleanliness, variety. Further on, the showing of dogs, buying and selling, the sending of them by train, and—curiously—their use as beasts of draught, are all amply dwelt upon. Then comes the question of dogs in their relation to the law, the rearing of puppies, and the breeding of dogs for either pleasure or profit, and a very important subject—their diseases and how to deal with them. The remaining chapters are taken up with complete descriptions, aided by excellent woodcuts of all the best-known breeds of dogs; these are all very clearly and pleasantly written, and occasionally intermixed with anecdotes from the author's varied experience. The subjoined illustration is a good specimen of the engravings, and represents the champion St. Bernard mastiff, "Save," the property of Mr. J. F. Smith. This is stated by the author to be one of the most captivating dogs he has ever seen, and, though our space is limited, we must try to find room for his 'character,' as given by his master. 'His temper is as perfect as can be; he is particularly fond of ladies and children, and he is as gentle with them as a lamb; he will carry a child three years of age as steady as can be, also he has frequently carried his master (weight over thirteen stone) across the lawn; he has the strength of a lion, no two men can hold him by a chain if I call him, yet my little boy, three years old, can lead him with ease by the collar. A look or a word is sufficient to check him with any one he knows well. He is particularly fond of being admired, and when visitors call to see him he invariably shows himself to the best advantage.' 'Save' is evidently a grand dog, and the description quite makes one wish to make his acquaintance. There are many such fine specimens as the one we have quoted to be met with in Dr. Stables' charming book, and to any of our readers who are at all 'doggy' we cordially recommend a perusal of it.

Familiar Garden Flowers. Figured by F. EDWARD HULME, F.L.S., F.S.A., and described by SHIRLEY HIBBERD. Third Series, with coloured plates. London: Cassell & Company, Limited.

WE have had the pleasure of reviewing the first two volumes of this beautiful and delightful work, and now the third is before us. We must repeat the high praise we have already bestowed upon its predecessors. There are, as in each of the preceding volumes, 40 illustrations, and they are in truth most exquisite works of art. We have the following:—Orange Lily, Rhododendron, Double Daisy, Spanish Iris,

White Begonia, Turbinate Bellflower, Ranunculus, Winter Heath, Red Avens, Spider-wort, Achimenes, Coronilla, Crown Imperial, Ageratum, Hawkweed, Common Flax, Clove Carnation, Polyanthus Narcis, Gloxinia, Double Trumpet Daffodil, Honesty, Poet's Daffodil, Pelargonium, Double Kerria, Oxlip, Blue Nemophila, Camellia, Heliotrope, Darwin's Barberry, Cornflower, Wild Geranium, Garden Avens, Mountain Clematis, Double Pæony, Yellow Columbine, Jacob's Ladder, Spotted Deadnettle, Broad Bellflower, Pulmonaria, and Swallow-wort Gentian. The figures are reproduced with rare delicacy from Mr. Hulme's beautiful drawings. Mr. Hibberd's text is admirable, and the book from cover to cover is a gem.

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BLOWING DOWN OF A FAMOUS TREE AT AUCHTERGAVEN, PERTHSHIRE.—A furious gale of wind, from the west, sprung up shortly after midnight on Wednesday, the 12th Dec., accompanied in the fore part of the night with rain and sleet. A good deal of damage was done to plantations, many trees being blown over, and not unfrequently with their tops lying westward. But, most remarkable of all, the celebrated 'Bell Tree,' near the site of the old Castle of Nairne, was blown over from the very root. It measured 15 ft. in circumference at 6 ft. from the ground, but was greatly decayed, and now lies an encumbrance, fit for nothing but fuel. With it passes away the last vestige of former greatness. The stout Ash stood probably for 200 years, holding a stubborn shoulder to the blast. Frequently a limb has been torn off, and now the whole gnarled mass lies prostrate. A ring in one of its forks is said to have been caused by the bell-rope in the days of its greatness, from which hung the bell used to gather the inmates of the castle to the festive board, and which, no doubt, was merrily rung to welcome there the 'Bonnie Prince Charlie,' while his hopeful Highland army rested on the Moor of Thorn near by.

PYRAMIDAL OAK.—A writer in the *Garden*, says: There is an interesting note respecting this in the journal of the French National Horticultural Society. It appears to occur somewhat sparsely through the south-west of France, and has been much planted in the departments of Haute Garonne and l'Ariège. Especial mention is made of a fine group of this tree in the park of Verdais (Haute Garonne), and a true idea of the form which this Oak assumes when in full growth may be gathered from the fact that whilst the trees rise to a height of more than 100 feet, they do not individually measure more than 30 feet through at the base. I find that Gillet and Magne in their 'Flore Française' mention a variety of *Quercus robur* under the name of *fastigiata*, the description of which accords with the above. Loudon also has it in his *Hortus Britannicus*, giving it as a species and as a native of the south of France, but I should fancy that Gillet and Magne are right, and that it is but a variation of our common Oak. This Oak may be better known to planters in this country than I am aware of, but I do not remember seeing special mention made of it, and it seems to me to be such a valuable tree as to warrant its having a place in every park. The great tendency of our forest trees is to assume rounded, flatheaded masses of foliage, but here we have one which is apparently so distinct of form as to afford a welcome and decided contrast. If, as I think it may be safely assumed, it is a variety of the common Oak, its hardiness is of course beyond all question, and it should be looked after by tree planters generally. I do not know whether it comes true from seed, but in all probability it does, seeing that it occurs over a widespread tract of country. It should not be difficult to procure acorns of this pyramidal Oak, and perhaps I may be helping those wishing to do so by mentioning that the attention of the French National Horticultural Society was first directed to it by M. Leo d'Ounous de Saverdun (Ariège), who furnished the details from which the note in their journal was compiled.

Australian Forests.—Dense forests are increasing in Australia, the climate is growing more moist, and even the great central desert may become habitable.

Forests in Carolina.—There are no less than 40,000 square miles of almost unbroken forests in North Carolina—Pine, Chestnut Oak, Maple, Beech, and Hickory, in their finest growth.

Timber in New South Wales.—The impression that New South Wales is destitute of timber useful for industrial purposes is erroneous, says a contemporary, since the magnificent collection of woods prepared by direction of the Colonial Government for the Calcutta Exhibition includes various kinds of Cedar, Boxwood, Gum, Wattle, Myrtle, and Pine, and many other kinds known only by name to Europeans.

Old Oak.—The remains of the Charlemagne bridge over the Rhine at Mayence was recently being excavated, and the timber was found to be well preserved. Some of the Oak is as black as Ebony and very rich. Mr. Joseph Patrick, of Westendstrasse 1, Frankfort-on-the-Main, has had some carved chairs, with pressed leather backs and seats, manufactured from some of the best piles.

Forest Growth.—A remarkable instance of the rapid growth of forest trees, says an American paper, recently came to light, which was the result of a search for the original survey marks, placed upon a Beech tree by two surveyors about twenty-seven years ago. They were searching for a corner of a section, and found it by chopping into the side of the tree about three inches and splitting a section off which uncovered the original mark, which shows the letters 'N.B.T.' which were indented in the flatted surface by the Government surveyors. The wood is perfectly sound and solid, and the black paint still adheres to the surface. The specimen will be placed on exhibition to satisfy the curiosity of the public.

A Few Wonderful Trees.—The 'Kit Carson tree' on the ranch of Henry Kellogg, near Las Animas, Col., is twenty-feet five inches in circumference two feet from it sbase. A Pine tree in Irwin County, Ga., has two distinct bodies, but only one top. The trunks grew out of the ground about five feet from each other, but at forty feet grew into each other, forming one tree, with one top. The walnut tree which served as a whipping-post where deserters and Tories were punished during the Revolution, still stands near Fishkill. The iron rings to which the culprits were tied while being whipped are hidden by the bark that has grown over them. A Buttonwood that was vigorous tree during the Revolution still stands on the farm of George San ger, Canterbury, Con. It is seventy feet high, the trunk measuring sixteen feet in circumference two feet from the ground, and is the same size around twenty-five feet above, where the branches first project.

When to Cut.—A correspondent of

an American paper says :— 'For strength, beauty, and durability, I have found August, September, and October the best, and February March, and April the worst months to cut wood. A Red Maple cut in September will keep in a round log perfectly white and sound until the next August; while one cut in March will begin to blacken and decay by the middle or last of June. This is not copied from any scientific work, but is what I have found to be a fact by many practical tests, Gray Birch cut in September will keep in a good condition until the next September if left in the woods cut in four-foot lengths; while if cut in March and left in the same way it will be nearly worthless by the 1st of August—at least, such is the result on my land. White Pine, like Red Maple, keeps white much longer if cut in September than if cut in March, and is not injured by the worms so much. I have found that wood dried slowly in a low, cool place is better than dried quickly in the hot sun, even though cut in summer. May this not in a measure account for wood being better cut in autumn, it having the cold winter to dry in?'

Archæological Discovery in Berkshire.—Mr. Rutland, honorary secretary of the Berks Archæological Society, assisted by Dr. Stevens, has made another interesting archæological discovery near Maidenhead, about 100 yards west of the Thames, says a leading paper. On opening a tumulus in 'Batlyngemead,' a small, angular building was found, containing a fireplace. Among other articles found therein was a quantity of buff pottery, coated with greenish-black glaze of the 14th century. This discovery cleared up the period at which the building was formed, but it is difficult to say who the occupants were. They could not have been very lowly people to have used pottery of that character. Earthenware vessels were costly at that period, and even the nobility used chiefly vessels of silver, wood, or pewter, on account of their durability. It was thought by Mr. Rutland that, as Queen Elizabeth let the fishing of the Thames in parcels for periods of 21 years, the hut was the abode of a river ranger. It might have been the casual residence of a forester or ranger in the ancient Forest of Windsor, which, although nominally disafforested in the 13th century, virtually remained a forest for centuries after that time, as disafforestation did not mean the actual destruction of the forest, but the parcelling out of portions of it to those who had been serviceable to the Crown and others, thus leading ultimately to itsdestruction. Flint implements had been present, together with bones of ox, pig, horse and red deer, and scraps of Romano-British pottery, similar to those found in the mould of the Taplow mound on the opposite river, proving, as he believed, that various people had frequented both sides of the river from the earliest times, and that the Saxons in removing the materials of the hill to form the tumulus, had unknowingly built up their mound with earth containing relics of earlier occupants of the hill.

VOL. VII., MAY TO OCTOBER, 1883 OF
FORESTRY was completed with the October Number, and is on sale, bound in handsome light green cloth gilt, beautifully illustrated, price 7/6.

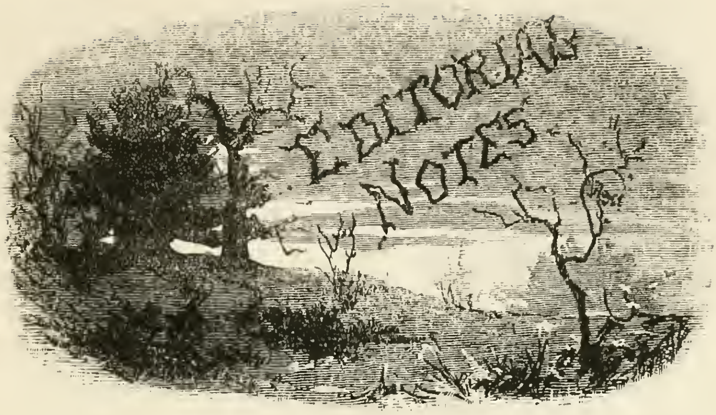
VOLS. IV. TO VII. of 'FORESTRY' (yearly volumes) are still on sale at 15s. each, bound in green cloth gilt. Vols. I., II and III are out of print.

VERY HANDSOME BINDING CASES for Vol. VII
are on sale at the Publishing Office, at 1s. 6d., or, 1s. 9d. carriage free.

NOTICE TO CONTRIBUTORS AND CORRESPONDENTS.

It is absolutely essential that all MSS. for insertion should reach the Editor *not later* than the 15th of each month, *and at an earlier period of the month whenever possible*. Books for review must also be sent before the middle of the month. Letters for the Editor's Box should be as *short* as possible. The place for long contributions is in the body of the magazine. It is a *great assistance*, both to editor and printers, for MSS. to be well and legibly written, and on one side only of the paper.

⁂ Urgent communications for the Editor should be addressed (personally to him) Underwood, Kew Gardens.



TIME alone can prove whether the present system of selection and training of candidates for the Indian Forest Department is calculated to produce the best men for the Indian service. The system is now under revision; but, as it is worked at present, candidates before going to Nancy are submitted to a somewhat wide test examination conducted by skilled experts, in various branches. It certainly says something for the thoroughness of their training that about half the successful candidates during the last five years, including Messrs. Muriel, Jackson, and Corbett—the three first in the list for the recent examination—have been pupils of Messrs. Wren and Gurney. These gentlemen have all been trained in Natural Science by Professor Boulger, who has been a contributor to our pages from the first volume of the 'JOURNAL.' The remaining successful candidate, Mr. Foster, was also a pupil of Mr. Boulger's in Botany.

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APROPOS of the question of forest training at Nancy, we desire to call the especial attention of English candidates for this training to an admirable book which Messrs. Cassell and Company have just sent us. This volume is no other than the one hundred and sixty-sixth thousand of their excellent and marvellously cheap Anglo-French Dictionary. How such a mass of well-printed matter (1,122 pages), capitally and strongly bound, can be sold with profit at the price of three shillings and sixpence, we are fairly puzzled to understand. The enormous sale which this popular and well-known Dictionary has secured, of course partly explains its amazing cheapness; but even this great sale can scarcely show much profit, with so very small a selling price. In any case, Messrs. Cassell and Company do great public service by the popularisation and cheapening of books like this one, and we heartily wish their genuine enterprise all success. Our faith had heretofore been bound up in our two-volumed 'Spiers', an expensive book when we first bought it, but we are now convinced that no library can be complete without Messrs. Cassell and Company's popular French Dictionary.

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From the latest accounts to hand, the International Forestry Exhibition at Edinburgh appears to be rapidly assuming immense proportions, and the Executive Committee will have abundant work for the next few months, in shaping and directing such a gigantic undertaking to a successful termination. The time is drawing near when they will have the particulars of innumerable entries, from every clime where trees grow, to discuss and arrange for exhibition in systematic order, and the time at their disposal will not admit of any unnecessary delay in making final arrangements. The greatest energy and good management will now be required to get the Exhibition buildings erected, the exhibits properly classified, and every detail arranged, in time for the opening of the Exhibition at the stipulated date, early in July.

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Our readers will be gratified to learn that one of the very best sites in Edinburgh has been at last secured—so we are officially informed—upon which to hold the Exhibition. The Governors of Donaldson's Hospital have generously placed the spacious lawn and terraces in front of that splendid and palatial building at the service of the committee, who have also been fortunate in securing the use of an adjoining field, from the Governors of Heriot's Hospital. Altogether, the committee have now abundance of space at their command, the area of the whole being upwards of 20 acres. The spot selected is in the most fashionable part of Edinburgh, and is within a few minutes' walk of Princes Street and several railway stations; so that it is of the easiest access, both to exhibitors and to the public.

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As the entries close on the 1st of March, we would press upon our readers the immediate necessity of making up their minds about what they mean to send to the Exhibition, and of making their entries without delay. There need be no hesitation on the part of any one about sending any article, or number of articles, of a proper nature—that is, having some connection with forests and their produce—in the fear that they will not be accepted. The committee must now have ample space and verge enough to accommodate samples, specimens, and exhibits, of every imaginable shape, size and importance, that can be sent to them by the professors of the science and art of forestry throughout the globe.

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At home, we trust that our foresters will do credit to themselves by each and all contributing something of interest, however small, to the general display. There are numerous ways and means for every one who desires to contribute to do so. It may be in the form of some natural or manufactured product, useful design, rustic-work, improved tool or implement, artistic designs and drawings from nature, plans of estates, forests, buildings, bridges, timber slides, river warping, &c., and in a host of other ways which the ready invention of intelligent men will soon find out. We are confident that our foresters are well able to hold their own in all these matters, and we look forward to seeing them make one of the most useful and interesting displays in the whole Exhibition.

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To the owners of forests and woodlands the subject is undoubtedly of the highest importance. Of this they appear to be fully aware, judging the large number of them who have already given their patronage and ready help to the undertaking. It is therefore hardly necessary for us to fear that they are likely to overlook sending such contributions as their estates and woods produce to the Exhibition, or to neglect to send their foresters to see the display and to reap the full advantages which such an Exhibition is so well calculated to afford to every observant and intelligent man.

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From all we have heard, the Dominion of Canada, India, and our various Colonies, are determined to be well represented at the Exhibition, and are all busy preparing extensive and valuable collections of their forest products and other objects of a useful and interesting nature connected with forestry in the various dependencies of the British Crown. The United States of America, with their vast forest resources, are making especial efforts to produce a display equal to the great importance of the subject; and, with their wonderful ingenuity and their determination to overcome all obstacles, we may safely anticipate that they will succeed in what they have undertaken.

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The States of the Old World, too, do not mean to be out of the race if they can help it, as most of them have indicated a ready willingness to take part in the International display. Even from the ancient kingdom of Persia, and the countries which owned the sway of Greece and Rome in the early ages, various rich and interesting collections are to be forthcoming; and of course the modern empires and kingdoms of Europe will be to the fore, with exhibits in quantity, quality, and variety amply sufficient to show to the world the immense importance of forests to modern science and arts, and to prove what an important factor they are in the internal economy of every prosperous State.

⁂

How vital indeed is the importance of this great subject is cleverly shown in the following lines, which have been courteously sent to us (cut from the *New York Sun*) by Mr. Robert Bright Marston, the able Editor of the *Fishing Gazette*. The lines represent what this world would be without the forest and stream :—

"I HAD a dream which was not all a dream!"
A great State was a desert, and the land
Lay bare and lifeless under sun and storm,
Treeless and shelterless. Spring came, and went,
And came, but brought no joy ; but in its stead
The desolation of the ravening floods
That leaped like wolves and wildcats from the hills
And spread destruction over fruitful farms,
Devouring as they went the works of man,
And sweeping southward nature's kindly soil
To choke the watercourses, worse than waste.

The forest trees that in the olden time—
The people's glory and the poet's pride—
Tempered the air and guarded well the earth,
And under spreading boughs for ages kept
Great reservoirs to hold the snow and rain,
From which the moisture through the teeming year
Flowed equably but freely—all were gone,
Their priceless boles exchanged for petty cash.
The cash had melted, and had left no sign ;
The logger and the lumberman were dead ;
The axe had rusted out for lack of use ;
But all the endless evil they had done
Was manifest upon the desert waste.

Dead springs no longer sparkled in the sun :
Lost and forgotten brooks no longer laughed ;
Deserted mills mourned all their moveless wheels ;
The snow no longer covered as with wool
Mountain and plain, but buried starving flocks
In Arctic drifts ; in rivers and canals

The vessels rotted idly on the mud
Until the spring floods buried all their bones.
Great cities that had thriven wondrously,
Before the source of thrift was swept away,
Faded and perished, as a plant will die
With water banished from its roots and leaves;
And men sat starving in the treeless waste,
Beside their fruitless farms and empty marts,
And wondered at the ways of Providence!

⁂

YET how easy is the process of reproduction! Marvellous indeed are the recuperative powers of the vegetable world, and kind Nature, who first gives us the countless germs of plant life we call seeds, is ever ready and waiting to favour the efforts of the planter. It is all a question of energy, and application, and method on the part of man. There is a good deal of individual action of this kind, although there might be much more; but the question has long been too urgent in its importance for merely individual action. The States of the world whose forestry is in decadence must take up the question, for it will not brook much further delay.

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THE preceding paragraph has been partly suggested by the arrival of a budget of Spring Seed Catalogues from some of the most enterprising of our English nurserymen. We are especially attracted by the gaily-coloured wrappers suggestive of spring and growth, of these periodical *répertoires* of the possibilities of plant culture.

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FIRST to arrive and claim notice by the gayness of its dress is the bulky catalogue of the well-known firm of Little & Ballantyne, of the Knowefield Nurseries, Carlisle. The list is capitally illustrated, and includes novelties and recent introductions in vegetable and flower seeds, as well as everything that the most ardent cultivator of farm or garden could need or desire. Here also are lists of grass seeds, seeds of sub-tropical plants, farm seeds, rye-grass, clover, turnip, mangel, &c., seed potatoes, seed grain, implements and tools (illustrated) for farm and garden, horticultural manures, insecticides, and, in short, as we have said, *everything* needful for the grower, big or small.

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NEXT to hand is the bulky list of Messrs. James Dickson & Sons, seed growers and merchants, of 108, Eastgate Street, Chester. This also is an illustrated catalogue, and a bulky one withal, and it would puzzle a gardener, we fancy, to point out anything connected with his craft not to be found in this catalogue.

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Further, we have to acknowledge the well-illustrated and gaily-covered catalogue of 'Vegetable and Flower Seeds and Amateur's Guide,' of Messrs. Dickson & Co., of 1, Waterloo Place, Edinburgh; and the pretty and well-illustrated vegetable, flower, and farm seed and garden requisite catalogue of Messrs. Wood & Ingram, nurserymen and florists, St. Neots and Huntingdon. A very pretty cover, too, distinguishes the ample lists of seeds and 'requisites' of Messrs. Ryder and Son, seedsmen and florists, of Sale, near Manchester. The last catalogue on our list is that of the *Etablissement horticole de Bruant.*

* * *

The late Storm.—The following report, by Mr. James Kay, meteorologist to the Bute Archæological and Physical Society, on the late storm, will be interesting as showing the effects of the gale :—

The storm which swept over the British Isles on the night of the 11th and morning of the 12th has been the most disastrous to the woods and plantations in the Island of Bute for many years. The devastation has been so great in every plantation that it is almost impossible to form a definite estimate of the number of trees uprooted, but it far surpasses the great 'Tay Bridge' storm (Christmas 1879) in its results, and there cannot be less than from eight to ten thousand trees blown down. The greater part of the trees have fallen with the wind from the N.N.W., and a considerable portion are lying due south (magnetic meridian), and must have been blown down during the height of the storm, between 12 and 2 o'clock on the morning of the 12th. As might be expected, the greatest damage has been done to those parts fully exposed to the storm, more especially where it has swept along gullies and depressions of the land, and where the full fury has been caught in the angles and bends in plantations. There the storm had literally ploughed a tract for itself. Trees large and small, young and old, have shared the same fate, and in many cases what did not yield at the roots has been snapped right over, in some cases a few feet from the ground, and in others from 30 to 40 feet up. For some days previous to the storm the barometer stood excessively high, registering 30·510 on the morning of the 7th, descending to 29·364 on the night of the 9th, again rising to 29·530 on the morning of the 10th, and descending to 29·200 by the evening of the same day. At 9 a.m. on the morning of the 11th it had again risen to 29·414, and by 10 o'clock p.m. it had fallen to 28·668, thus showing a depression to 7½ tenths from 9 a.m. With previous storms the greatest destruction has mostly taken place with the storm from S.W. to W.; but in the case of that under notice, the greater part of the damage has taken place with the wind from N.N.W. to N., thus causing great destruction to plantations from a point from which they have hitherto received comparatively little injury.

DECAY OF FALLEN LEAVES.

IN the following brief remarks it is professed rather to seek for and invite information than to provide it, on this rather intricate subject. In the course of an article on 'Leaf Canopy and Pruning,' the decay of fallen leaves had necessarily to be referred to, and in connection with that incidental reference an explanation has been specially requested. A few words may therefore be offered, attempting to make the position plainer.

It can hardly be controverted that it has been sufficiently proved by thousands of instances, both in leaf woods and needle woods, that the decay of fallen leaves *in situ* is most beneficial to the growth of the trees that have shed them. This much then we may take for granted.

In tracing further the more superficial or visible aspects of the progress of decay, the following details seem very probable. The leaves decay most rapidly when they are exposed to the greatest extremes of alternating moisture and dryness, and the most violent changes from heat to cold. That is, leaves decay most rapidly when quite exposed to weather in the open.

Under the shade of trees excluding much of the sunlight and much of the rain, leaves decay more slowly. This latter protracted process of decay is, however, in general, more favourable to vegetation, and especially to the growth of trees, and adds an increased quantity of useful substances to the soil. The rapid rotting of leaves or other vegetable matter is, chemists will tell us, a process analogous to thorough combustion. Leaves decaying rapidly in the open will thus vanish for the most part into thin air, and leave hardly any residuum to be added to the soil. On the other hand, leaves decaying under the shade of leaf canopy undergo a mouldering process more analogous to charcoal burning or charring, and the result is a much greater quantity of powdery *humus* to be added to the soil. In the latter case, too, the carbonic and nitric acids evolved in the process of decay have better opportunity of sinking into the ground, or, at any rate, less chance of being wafted away by winds. Therefore, as was stated under *fourthly*, the shade of leaf canopy usefully moderates and retards the decay of the fallen leaves and organic refuse. The leaf canopy must not, however, be too dense, nor the trees too close together. Instances have occurred, most frequently in Beech woods, where the coverts have been maintained too dark, the trees being too close together, owing to procrastination or insufficiency of thinning. Here, although the crowded trees shed great wealth of leaves, no benefit accrues therefrom to the soil or the arboreal vegetation. This is because the mouldering process has become so slow as to have practically ceased. No humus is being produced, but the accumulations of leaves are lying dormant, under conditions similar to those of a dry shed. In summer no rain can penetrate to them, and it is in summer chiefly that the rotting process goes on. We may therefore conclude that leaf canopy has a great effect on the formation of humus, and that it, is possible to maintain leaf canopy either on the one hand too close, or, on the other, too open.

It is possible so to regulate the closeness or openness of the canopy as to delay or accelerate the decomposition of the fallen leaves, and thus to favour the production of humus. The means of effecting this are supplied by the periodical thinnings. It is frequently contrived that these shall be repeated in each part of the forest every ten years; better still, if they can recur every five years and be more moderate. With a view to the fallen leaves and their importance, the aim of a thinning should be to leave such a degree of canopy that a little light will reach the ground. It should be attempted to leave spaces between the outermost twigs of most contiguous trees, but never to remove a tree which would leave a large space. The spaces or gaps left in the canopy by a thinning should never ordinarily be wider than what may be filled up in a few years by the spread of the crowns and the rapid extension of the side twigs. The degree of canopy aimed at in carrying out a thinning should be such as might permit of the temporary appearance of tufts of grass or weeds here and there, but not for long. In a few years, and considerably before the next thinning is due, the spreading of the tree crowns, wherever there was room, ought to have restored completeness to the canopy, and re-established a shade so thorough as to kill the grass.

The effects of humus and fallen leaves form an intricate subject for investigation, demanding the co-operation of foresters and chemists. A good deal of labour has been expended in this direction by both classes of investigators in Denmark, France, and Germany, and also by individuals combining in some degree both qualifications. Their results, it seems, have sometimes been conflicting, but a summary of them would be desirable before starting, in this country, original investigations.

N. N.

THE GIANT CYPRESSES OF VERONA.

IN point of interest and importance second to Venice alone amongst the towns of Venetia, Verona has long been a favourite halting-place for the traveller in Northern Italy. Its attractions, taking into consideration the size of the town, which has a population not exceeding sixty thousand persons, are many and various. The magnificent Arena, considered to date back to the reign of Diocletian, will satisfy the antiquarian; there are numerous churches, and especially S. Zenone Maggiore, well worthy of the attention of lovers of architecture and painting; and the Piazza delle Erbe, filled with fruits and flowers, together with the neighbouring squares and streets, will charm the seeker after the picturesque. There is one spot, however, in the outskirts of the town which holds out special attractions to those who make arboriculture or floriculture a study, and here the feet of any reader of 'FORESTRY' who may visit Verona are sure to tarry awhile. Let me in a few words attempt to portray the scene.

From the strong fortress of S. Pietro, crowning the rugged hill which rises abruptly from the northern bank of the Adige, a turbulent muddy stream a hundred yards in breadth, the high ground runs north to the Castello S. Felice, and thence trends southward, within the line of fortifications, which enclose the entire town, in the form of an elongated horse-shoe, finally losing itself in the level of the Lombardy plains close to the Church of S. Pietro Martire. To the point where the horse-shoe is thus brought to an end I would direct the traveller's steps. Passing down the narrow Via S. Maria in Organo, and glancing up an unused grass-grown bridle-path leading eastward, one sees towering up within the confines of a high white-washed wall the spires and crowns of a wilderness of shrubs and flowering trees, evidently forming what in ancient times would have been termed a 'paradise' of no ordinary kind. Entering at a gateway in the main street the visitor finds himself in a large courtyard, bounded on three sides by the walls of a mansion of no mean pretensions, and on the fourth by a massive and very tall railing of open iron-work, through which the beauties of the famous Giardino Giusti appear spread out before him.

A small *douceur* suffices to obtain admission, and the first glance reveals the pride of the garden. Away from two statues which face the gateway stretches a broad gravel path to where, a hundred and twenty yards distant, a tall flight of stone steps leads up to the base of the cliff, which shuts in the garden to the eastward. On either side of the path superb Cypresses, planted in regular succession, up-lift spire-like shafts of evergreen foliage into the glowing blue of the Italian sky. The trees stand very close together in the lines, not more than from seven to ten yards separating them, so that, looking from the end of the path, one sees a perfect wall of foliage extending away to the base of the cliff, for the lines do not come to an end with the pathway, but climb up in terraced beds at either side of the long flight of steps. The avenue thus formed is as absolutely regular and perfect as the world-renowned avenue of Palms at Rio, and the avenue of ancient Yews in the gardens of Melbourne Hall, Derbyshire, which some months since formed the subject of a very interesting article in the pages of 'Forestry.' And not only is the avenue striking by reason of its rigid regularity; its component parts boast of exquisite symmetry, great freedom of growth, luxuriant foliage, and, perhaps, unsurpassed altitude. The symmetry of the Cypress renders it conspicuous among a collection even of ornamental trees and shrubs; the elegance of its tall tapering trunk, round and up which the branches cling and cluster, clothing it completely with their profusion of black-green foliage, never fails to attract and please the eye. Amongst deciduous trees, a Poplar gives, though in a smaller measure, the same effect, and is always welcomed by the artist or the lover of landscape scenery. In Australian forests the Sassafras is similarly a subject of admiration, its growth being very much akin to that of the Cypress, and the beautiful hue of its light-green foliage offering a grateful contrast to the brownish-green tints of the Eucalypti. So fresh indeed is the appearance of the leafage clothing its lofty spire when the sunlight streams upon it, that it would almost seem as if it had sprung up from the floor of the forest as the growth of a single night, and was flourishing in its perfection of beauty for a few short hours only before the fervid rays of an Australian sun should effect its vivid greenery.

But to return to my notes on these giant Cypresses. Giants they are in very truth; the eye tells one that at the first glance, and accurate measurement affords full confirmation of early impressions. The trees vary but little either in growth or altitude, or, as far as can be judged from observation, in age. I could not ascertain when they were planted, and I am ignorant of the average length of life of a Cypress, though I believe it to be of far longer life than the majority of our English forest trees. At a guess, I should say that all the trees in the avenue were more than a century old, and certainly not one of them exhibited the smallest symptom of incipient decay. Each is so exactly a counterpart of its neighbour that one cannot help feeling that when decay has once set in, a few years only will elapse between the demise of the first and the last. Proceeding to measurements, I found the average girth of trunk at four feet from the ground to be about seven feet; the height of the tallest is stated at one hundred and twenty feet, and this did not seem to me to be an exaggerated estimate. The uniformity in point of growth is very wonderful, and I do not think that there was a difference of more than ten feet between the tallest and the shortest in the whole avenue. Nearly all the trees are bushy with foliage from the very ground, though their greatest girth is probably some twelve feet up, from which height they taper aloft with exquisite symmetry to the tiny topmost twig that thrusts itself needle-like into the blue. The monotony of the dark green foliage was pleasantly varied at the time of my visit, in late October, by the profusion of large drab-coloured seed-pods, of about the same size as a golden pippin apple, which, in the bright sunshine, stood out in bold relief. In nearly every tree the branches clung closely to the parent trunk, giving an aspect of perfect symmetry and compactness, which is just wanting in the Poplar, but is borne to its fullest extent by the Sassafras. In comparing these noble Cypresses with those in many of the gardens of the villas on the shores of the Italian lakes, I not only failed to find any of the latter of equal altitude, but their symmetry was, as a rule, decidedly inferior, their upper branches in many instances diverging considerably from the trunk, and being bent and twisted, probably owing to the severity of the winds which sweep down from the Alps during the winter months.

It must not be thought that the famous avenue contains the only specimens of the Cypress to be found in the Giardino Giusti. A still larger number are dotted about all over the garden, not a few of which, by reason of a higher stand-point, tower many feet above the loftiest in the avenue. One of these has, as it were, eleven smaller trunks springing upwards from its butt, forming with the main stem a bamboo-like clump as much as thirty feet in circumference six feet from the ground. This tree, however, like all its fellows, preserves its compact, close-growing habit, its dark green shaft tapering upwards a hundred feet in absolute perfection of form and detail.

But, irrespective of its superb Cypresses, the Giardino Giusti is well worthy of a visit. That part of it which lies to the right of the avenue is devoted to the raising of plants and shrubs, and need not be alluded to. On either side of the steps which lead up to the cliff is a wilderness of evergreen and deciduous shrubs of low growth, from amongst which rise specimens of Mountain Ash, Lime, Scotch Fir, Cedar and Douglas Pine. In the cliff-wall are several caves, one which is filled with a tribe of tame rabbits, and on either hand winding walks lead up to a higher terrace, from which a spiral stair-way, hewn out of the cliff, leads to its summit, at a height of eighty feet above the level of the main garden. This highest terrace extends back from the edge of the cliff for some thirty yards, and extends along it for the entire breadth of the garden—about a hundred and twenty yards. It has several fine Cypresses, and a variety of shrubs and trees, and commands a magnificent view over the entire city and far away to the snowy peaks of the Alps. Here, at my ease, on a rustic bench, I spent one of the pleasantest hours I have ever known in a garden.

A glowing, cloudless sky intensified the brilliant colouring of the landscape; a fresh bracing breeze, gently swaying the tall spires of the giant Cypresses, tempered the sun-heat, and wafted from the distant piazza the strains of a military band. Nor was vocal melody wanting, for the birds were singing gaily in the shrubberies, and from the adjoining villa came the full rich notes of an Italian girl practising the soprano music of an opera. Huge locusts and butterflies were sunning themselves in the glow of noon-tide, and the bright-eyed lizards darted hither and thither over the pathway. The lower terrace is no more than a path a few feet wide cut out of the cliff, but is well utilised, Honeysuckle, climbing Roses, and various creepers being trained upwards from it so as to clothe the face of the cliff with foliage and flowers. It is terminated by a miniature marble temple, a delightful retreat during the hot summer days; and beneath it the wall of rock is entirely concealed by Virginia Creeper, which at the time of my visit was a grand blaze of crimson, visible from all parts of the garden, and forming a brilliant background of colour to the dark green of the Cypresses and Pines.

The main portion of the flower garden lies to the left of the avenue. The centre of it is a maze of parterres, divided by tiny gravelled walks, edged with Box a foot wide. An old fountain gurgles and splashes dreamily, and here and there a quaint statue, utterly unworthy of the surroundings, stands on its mouldering moss-grown pedestal. The flowers were past their prime, but that variety was not wanting may be judged from the following list which I jotted down in my note-book:—Rose, Petunia, Aster, Gladiolus, Marigold, Zinnia, Chrysanthemum, Balsam, Cockscomb, Stock, Dahlia, Everlasting, Coleus, Antirrhinum, Gaillardia, Ageratum, Geranium, Portulaca, Phlox, Phlox Drummondii, Verbena, Periwinkle, Pansy, Lobelia, and Fuchsia. Others there were of the names of which I was ignorant. Box and Myrtle hedges separate a portion of the garden where the glass-houses and forcing-beds are situate. The principal shrubs and trees I noticed were Douglas and Weymouth Pine, Spruce, Scotch and Silver Fir, Orange and Pomegranate, each with fruit ripening, Rhododendron, Bay, Laurel, Ash, Rowan, and Yucca, besides various rare specimens unknown to me.

The charm of this lovely garden forms one of my pleasantest memories of Northern Italy.

A. G. GUILLEMARD.

TREES IN THE DOLOMITE DISTRICT OF THE TYROL.

BY EDWARD JOHN TILT, M.D.

ON the way to the Tyrol, by Flushing and Munich, the traveller first passes through the young Fir woods—*Pinus maritima*—that clothe the monotonous shores of Holland. He finds fine Fir forests in Hesse Darmstad, finer still and more extensive in Bavaria, but he will not see a tree more than sixty years old, for foreigners do not love old trees as we do. Even in mountainous countries, where Fir trees are indigenous, they have no chance of growing to full size, unless they be high up in the mountains, three or four hours' march from the haunts of men. Thus Fir trees of immense size may still be found above Rosenlaui on the way to the Grosser Scheideck, also in Val Buona, three hours' march from Cortina and near Paneveggio, about four hours from Neumarck. At Inspruck, Brixlegged and Varhn there is, however, evidence of good timber being still available for buildings in the fact of the principal rooms in recently-constructed hotels being floored with planks two feet wide. At Varhn, near Brixen, 1,900 feet above the sea-level, Acacias, Walnut trees and Spanish Chestnuts were thriving in the lower parts of the valley. Some of the Chestnuts were very old: two were twenty-three feet in girth at four feet from ground—all trees referred to in this paper were measured in the same way. One was twenty-eight feet in girth, and all three had been once larger, for part of the trunk had been torn away. The upper part, of the hills are clothed with fine Fir forests of no great age. Varhn is within an easy drive to Francesfeste, where the train can be taken to Toblach, which is the principal entrance to the Dolomite Mountains.

Before relating what kind of trees grow there, I must say something of the soil they grow in, and of the scenery they help to beautify.

The greater heights of Swiss mountains, their dark colour and seemingly imperishable material, their more extensive glaciers and larger covering of permanent snow, render them far more imposing than the Dolomite Mountains, but these carry off the palm of beauty so long as it depends on bold and varied outline and exquisite richness of colour, displayed on mountains ranging up to 11,000 ft. above sea-level. Dolomite mountains are made of magnesian limestone, and have colour of their own. When seen at a distance, they appear pink or yellow ochre, but when one studies a perpendicular cliff of dolomite about a mile off, with the sun full on it, it appears of a flesh-like yellowish pink colour. There is also a running pattern made by the fissures and rectangular cracks like those of a kind of china called 'crackling,' and all this is, as it were, frosted over by the weathering white of rocky excrescenses. The effect is similar to that of pink slips under white muslin, that ladies sometimes wear, but the sun makes the pink glow with a soft light that baffles description, and no Eastern monarch ever dressed his bride in robes so gorgeous as those in which the sun has clothed the Dolomites for untold ages. It is scarcely necessary for me to add that morning and evening Alpine glow produce effects on such mountains, that are never forgotten by those who have seen vast cliffs of fantastic mountain fringes of splintered summits turned to golden red and purple. The view of sunset on the Rosegarten Mountains, as seen from Botzen is well known : and this reminds me, that if any one in that neighbourhood wants to get a good idea of Dolomite scenery in little time, he has only to drive from Botzen to Vigo, and spend the following day in scrambling about the mountains.

No rock can resist the ever-progressing chemical action of air and water on its surface, and all mountains clothe their feet with rubble ; but the magnesian limestone of the Dolomites has a peculiar tendency to break up. The surface of the rock gets covered with cracks at right angles one to the other ; these cracks deepen, and in course of time the little angular blocks detach themselves from the rock. They have done so for countless ages, and have thereby heaped up precipitous slopes of rubble that reach midway up high mountains. For instance, when at top of the huge mass of the Costonzello Pass, Cimon Della Palla was seen reared about 3,000 ft. above us, and alongside of it rested a slope that only left about 1,500 uncovered, out of all its 10,968 ft. above sea-level. For a long time these more or less precipitous slopes remain unclothed: they look like spent avalanches, and are mistaken for snow. In time they get covered with self-sown Fir trees, and a forest spreads, fan-like, around the mountain, the youngest trees being nearest to it, the others growing larger and larger till the forest's edge is reached.

Grass takes as kindly to magnesian limestone as it does to the chalk of our Downs, and the Alpine climber is agreeably surprised to find park-like lawns and springy turf to rest on, seven or eight thousand feet above sea-level. San Martino is 4,800 ft. high, and there are beautiful downs, of which the turf is spread over the wreck of ages. An outlying range of comparatively low Dolomites called the Feltre Alpes are entirely covered with turf, and if we knew how long it has taken to accumulate the immense masses of rubbish, that half hide some of the Dolomites we might tell the day when their jagged peaks will have crumbled and will be buried under turf.

The Dolomite district may be entered from Italy by Belluno or Feltre; but in August it is cooler to enter it by Toblach, whence there is a magnificent drive through the Hollenstein that leads to Cortina. On descending into the Cortina valley, the road passes through one of those beautiful mountain passes—so common in these mountains—in which fine Fir trees spring from undulating lawns of smoothest turf. Many of the trees wore long grey beards of lichen hanging from their branches, and when many were thus affected the foliage of the trees was scanty, and they were evidently doomed. For those who want to see the Dolomites without 'roughing it,' the best place to stop at is Cortina, whence excursions may be made. It is situated at 3,970 ft. above sea-level, and this may perhaps explain why there is not much variety of tree. The Ash is the common tree in the valley; there are Willows near the river, some Walnuts and Chestnuts, Larches, and young Fir trees in abundance. The upper parts of the hills and mountains, up to about 6,000 ft., are clothed with fine forests.

I believe Scotch Fir—*Pinus sylvestris*—to be very common; so is the Spruce Fir—*Abies excelsa*. When the Dolomite meets the Porphyry, near Paneveggio, there are miles and miles of the Siberian Stone Pine—*Pinus cembra*, with seeds that are eaten by the peasants, as are the 'pignone' of the Italian Stone Pine. Large patches of Juniper—*Juniperis communis*—are met with on some of the hills. The trees I have seen are generally not more than a hundred years old, and most of them much younger, but in Val Buona, three hours' march from Cortina, in the direction of the Tre Croce Pass, I am told there are still plenty of Fir trees nine or ten feet in girth.

Before going further, I must allude to a common custom in the Dolomite district and in the Italian Tyrol, a custom most detrimental to the growth and beauty of trees, the autumnal stripping of their leaves and smaller branches. The garden of the priest's house at Cortina is surrounded by tolerably well-grown Ash trees, about 40 ft. high. One morning I found them completely stripped of all leaves and of many branches about the size of a child's wrist. I have seen Oaks, Beeches, Elms, Poplars, and Willows treated in this way, as well as the Ash, while Fir trees, Chestnuts, and Walnuts are left to their natural growth for obvious reasons. Surprised to find a hill covered with a Beech-wood copse, I carefully examined it and found the saplings were growing from wide-spread and evidently very old above-ground Beech roots. Down by the river at Cortina I have found a crowd of young Ash saplings growing from old Ash roots, that sometimes completely framed boulders of considerable size. At the back of the railway station of Mori, I found a lot of Oaks, about sixty years old, growing in the midst of rocks. Five such trees, besides scrub, grew from a wide growth of Oak roots curled round a rock, and from a hole in the root I picked a bunch of Cyclamen. These Oaks are all that remain of the vast Oak forests found there by the Romans, who gave the name of Roburetum to the neighbouring town now called Roveredo. It used to be the custom in England to lop off the young branches of trees to feed the deer in winter; the Tyrolese now do so to feed goats and to fodder their cattle, for they have no straw, and also for firewood. On going from Cortina to Caprile, I found the flanks of Tophana, 6,500 ft. above sea-level, thickly clothed with Larch and with Red and White Pine, but few trees were more than four feet in girth, and it surprised me not to find in the midst of the present generation any relics of old giants; none of those rotten stumps of Fir trees from fifteen to twenty feet in girth which are so common in the woods round Rosenlaui. On descending towards Andras, and beyond it, the timber was finer, and they were sawing wood three feet in diameter at a saw-mill we passed. Dolomite valleys are generally lined with Red and White Pine and Larch, but the new carriage-road from Agordo to Primiero winds down and up two parallel valleys, only about ten miles apart, and yet the vegetation is very different. The bleak, precipitous cliffs of the Agordo valley grow Fir trees in small number, whereas the Schennero valley is well lined with young Beech and other trees to the almost complete exclusion of Fir trees. The grandest drive in the Dolomite district is that from Primiero to Predazzo. Starting from Primiero, which is 2,345 ft. above sea-level, the road ascends for four hours, following the Cismone torrent river, encircling and getting nearer and nearer to the illuminated cliffs of the Cimon Mountain group. At 4,800 ft. above sea-level we passed the beautiful downs of San Martino, lying in their Fir-clad amphitheatre of Porphyry mountains. We had still one hour to climb before reaching the summit of the Costonzello Pass, when at last the huge perpendicular rocky mass of Cimon della Palla, crowned with rose-coloured splinters, nearly 11,000 ft. above sea-level, shone forth in all its glory, towering above dark festoons of Fir forests. Nor was this all; for on the other side of the road there rose other mountains, so solemn and dreary that the very trees refused to cling to their sides: the rounded, dark, purple mountains of the Porphyry formation, which divide with the Dolomites this part of the Tyrol.

On the other side of the Porphyry mountain range, at about 5,000 ft. above sea-level, we reached the great Austrian State forests of Travignolo. It was a grand sight to see Scotch Firs growing to perfection, many of them 100 ft. high, and from ten to twelve feet in girth. Among other Fir trees that grow in these vast forests must be mentioned the *Pinus cembra*, of which I omitted to say that its wood is fine-grained and easy to work, so that it is principally used by the far-famed Tyrolese wood-carvers.

This vast estate is carefully managed, and although there is an annual cutting down, to furnish 15,000 logs, 14 ft. long, the supply of timber seems inexhaustible, for replanting goes on at the same rate. The property is managed from Paneveggio (4,500 ft.) where an enthusiastic dendrologist would be made comfortable for a few days, while studying the beauties of the forest. At Predasso (3,335) porphyry reigns supreme. There Humbolt, Murchison, and a host of other geologists have been to see the extinct volcano, out of which once poured syenite, granite and the liquid porphyry that rests above the Dolomite formation.

From Predasso to Neumark, in the valley of the Adige, is another beautiful drive. Beyond Cavalese, and outside the Dolomite district, the road passed through extensive Fir forests. On descending towards the valley, part of the road was planted with fine Willows, out of reach of visible water. I noticed a Chestnut about 27 ft. in girth, and a fine Lime tree about 15 ft. In the valley we drove through Mulberries and Vines; *Saphoræ japonicas* were flowering gorgeously, and in Neumark I saw an Elder tree, reaching to the roof of a three-storied house. To this imperfect sketch of Dolomite trees, I may be allowed to add that at Riva, and on the shores of Lake Garda, Olive trees flourish abundantly, but there were none of great age, as at Mentone. Lemons are only extensively grown at Limone, a village in a bay two hours' row from Riva. They are grown there on terraces rising one above the other, but in winter they require to be placed under cover, whereas at Mentone the trees live in the open all the year round. The Garda lemons are, I believe, smaller, greenish, and only fit for home consumption. At the other Italian lakes, the Cypress is the tree that strikes one most, as it often breaks the monotony of soft outline and still softer colour. The two largest I met with were 6 ft. in girth, with the exception of one, which was 7 ft.; but it was growing in a well protected sunny spot of the Serbellone Gardens, near a fine Palm tree and an Oak, 12 ft. in circumference—the only respectable Oak I met with in a two months' trip.

WOODS AND WILDS OF SHETLAND.

THE shortest chapter in a famous history of Ireland is headed 'Snakes in Ireland,' and its contents consist of the brief announcement, 'There are no snakes in Ireland.' With regard to the woods of Shetland, it appears that in pre-historic times there were woods, and there may be again; but at the present period there are none. No other part of Great Britain is so completely bare of timber as the bleak hills and dreary wastes of these northern cyclades. When Mr. Gladstone called at the capital of Orkney the other day, in company with the last-made peer, the Poet Laureate, the people of Kirkwall trembled for the safety of their only tree, a little sycamore, which I remember standing in the main street. During my sojourn, I visited the chief planter of the Orkneys, who resides between Kirkwall and Stromness, at a spot which he has planted with the best kinds of storm-defying trees. He set them thick, and nursed them well, and a party of emigrant rooks from Caithness crossed the Pentland Firth to inspect them, with a view to nesting; but they found the trees too small and stunted for the desired object, and, after cawing on the subject, much more briefly than some other parliamentary chatterers elsewhere, they voted the mission a failure, and returned to Caithness. The rooks of these islands are its seagulls, their rookeries are on the cliffs. Gulls and plovers collect in Shetland, from all parts of the country, in summer, to breed. Such birds as larks are numerous, but those which are usually associated with hedge-rows and timber are scarce. It may be said, 'Why not plant, and plant as Pitt did, very successfully, at Walmer Castle—two for one?' *Nil desperandum* is, no doubt, a proper spirit for an improver.

Boles of trees of considerable size have been discovered in the bogs of the Shetland scatholds, and several writers have jumped to the conclusion that similar trees would grow now under the same circumstances. But what were the circumstances? There is a submerged forest off Cromer, in Norfolk, where the native trees of England, the Yew, Oak, and Wych Elm, grew on a site now sunk beneath the waves. They stand upright, *in situ*, as the forest grew on what was then dry land connecting our shores with the opposite continent. A similar tract of land connected Shetland with Norway, and as forests of Pine fringe the coasts of Norway, they might cover the hills of Shetland now if the old conditions were restored so that these rugged islands formed part of a continent having the sea only on its western side. Plantations may be secured against a bad aspect by means of nursing and fences: but the aspects in Shetland are all bad; the sea is always close at hand in every direction, and King Windy-Cap has but to shift his head-gear a few points, and the brine blast shifts with the cap. This is the great difficulty which planters have not been able to overcome. The climate is mild, milder in winter than any part of our Eastern coast from the Nore to Duncan's Head, as mild as the Hebrides, where trees and rookeries flourish very well; but one may hardly hope for similar ornaments in the case of islands cast away far from shelter-shreds upon the sea, torn into tatters, and too small, in many cases, for human habitation.

The vegetation of the country is rendered particularly interesting from the circumstances I have just mentioned. A work entitled 'The Flora of Shetland' was written by a young gentleman, a medical student, and member of a family noted for their literary talent—one of them having been the historian of his native islands, while another, the head of the family, and the laird of Buness in 'furthest Unst,' wrote a 'Glossary of Shetland Words.' The laird had tested the tree-producing capacity of the country, and showed me the results. But, before speaking of the dwarf specimens which form the substitutes for timber trees, I may say that, in spite of the language of an Act of Parliament of some years ago, conveying an erroneous idea of the severity of the winter, hard frost and deep snow are rare. The climate of Shetland is not so severe as might be inferred from its northern latitudes. Snow seldom lies long, ice thicker than a sixpence is rarely seen, and the temperature is not often low for any considerable length of time, the climate being equalized by the influence of the Gulf Stream, as it is throughout the whole of our western coasts, in England, Scotland and Ireland; it is, in fact, the most equable climate of all the stations of the Scottish Meteorological Society. The average temperature in August, the hottest month, is 54 deg.; that of February, the coldest month, is 38 deg. The mean annual temperature is 45·5 deg., while that of Edinburgh, which is 272 miles further south, is 47·31 deg.; of England, 49·51 deg.; and of St. Petersburg, which is in the same latitude as Shetland, but beyond the influence of the same warm ocean currents, 40 deg.

The story of the climate, however, is written in the vegetation, and I may mention that *Jesione montana* grows freely in Shetland, as it does commonly on the western coast of Scotland, though not on the eastern, where the climate is less mild. It is said that the Romans introduced the Apple into Shetland, and that Unst, the most northern island, was their *ultima Thule*. Apples are still cultivated, but their skin is tough and green, and, although they are carefully coddled behind the garden walls, the fruit is sour and poor.

The hills of Shetland are particularly bare, and as only oneeleventh of the country is cultivated and the rest is hill (total area, 563,200 acres; cultivated arable and pasture land, 50,720 acres), the islands are nearly all hill, while the hills are as bare as our barest downs. Instead of being handsomely whiskered with junipers twelve feet high and more, as you may see them at Comb Valley, near Albury, on the thin chalk of the North Downs, the shrubs of the scathold are of the poorest description. In some districts the surface soil is removed from the hills, and carried away, in accordance with the custom of a defective agriculture; and, if this is not the case, the force of the wind, charged as it is with saline particles, prevents even the hardiest shrubs from thriving. At the best, the covering of the hills consists only of stunted heather, rough grasses, rushes, sedges, moss, and patches of the blackberry, *Vaccinium myrtillus*, and Cranberry. Hills more black and dreary would be hard to find, and even if Shetland were not extremely interesting from the character or pursuits of its sea-born population, and the abundance of its birds and fishes, it would be worth a visit, so that the traveller from the South might be more thankful ever after for the blessing of those natural ornaments whose beauty 'never palls.'

We may thank the planters of Shetland for having ascertained, experimentally, the kind of trees best suited for their exposed islands, and which, at least, survive the gales that prevent them from growing into timber.

The laird of Buness, the late Mr. Thomas Edmonston, informed me that his place is too near the sea, and too exposed, for successful tree-culture. Buness could not easily be nearer the sea, which comes up to the gateway of the house, roars in at the windows, and almost flings its finny produce into the kitchen, so that the cook can take her choice of any kind of fish, from a *sillack*, a few inches long, to a halibut, called turbot here, weighing a cwt.; or, for that matter, a whale, since Balta Sound, beneath the windows, has been the scene of many a whale hunt, and runs red sometimes with the blood of the victims.

Dr. Samuel Edmonston, of the same island of Unst, planted trees and carefully protected them, on an acre of land, also near Balta Sound; and as Unst is only eight miles long by four wide, no portion of the territory can be very distant from an inlet which cuts into the centre of the island. The doctor's trees, therefore, were exposed to the immediate assaults of the sea spray, as well as to the damage of driving blasts coming from the neighbouring hills. To these drawbacks were added those of an easterly exposure and a thin soil; and, under all the circumstances, it is felt in Shetland that the experiment of planting has succeeded well, inasmuch as some of the trees have topped their fence and measure at the ground three feet in circumference.

This is the utmost success which tree-planting has attained in Unst, and it is doubtful whether anything better than dwarf timber could be grown in any part of that island in any aspect, however favourable. The prize plantations of Shetland are situated in a little valley near Lerwick, whose Norse designation would sound strangely in southern ears, for Englishmen have forgotten the sound of their original language, though they are proud of their Scandinavian blood. On this spot there are two well-sheltered small groves, whose planter, Dr. Arthur Edmonston, received a premium, adjudged by the Highland Society of Scotland, in 1824, 'for having planted the greatest number of trees on the largest extent of ground, between February 1st, 1822, and November 1st, 1824, of any proprietor or tenant in Zetland.' It will not surprise those who have climbed the hills of England and Scotland, and found the Sycamore at a greater altitude than other trees on exposed sites, to learn that the groves I have just mentioned are of Sycamore entirely. I admired, but did not measure these trees; they are probably as high as an undersized farmhouse, and equal in circumference to a beneficed clergyman—that is, considerably beyond the girth of a curate, and less than that of a grazier in good times.

A few other groves may be named in Shetland, and among them that at Busta, on the mainland, the largest island, where Mr. Gifford planted Sycamores near his house, on the very spot where the earliest Dutch fishermen pitched their trading booths. Many other kinds of trees have been tried, but none have withstood the wind and sea better than the Sycamore. Mr Thomas Edmonston, who possesses the salver awarded to his uncle, Dr. Arthur Edmonston, informed me that in the experiments at Unst, evergreens were found specially unsuited to the climate, and both the Oak and Spanish Chestnut refused to grow. Nothing from the Mediterranean would root and flourish so far up in the North Sea. The list of trees and shrubs which did succeed is limited entirely to natives of Scandinavia. Dr. Samuel Edmonston's list of most successful specimens comprises, first and foremost, the Sycamore, which succeeded best of all, and after it, the Mountain Ash, Elm, Ash, Norway Maple, Laburnum, Mountain Pine, Norway Spruce, Birch, and Elder.

I may here remark that the Hazel is reported as having failed at Balta, and yet it is one of the indigenous plants of Shetland, found in many of the little holms in the lochs, where it is not subject to the cropping of cattle, which destroys it on the scatholds. It is found growing wild with the Mountain Ash, Honeysuckle, Briar, and Willow on several of the islets, or elsewhere, when protected from the cropping of live stock. But for the clothing of a few spots with the specimens I have now mentioned, Shetland would be absolutely naked, and that is the aspect, as already stated, which the country generally exhibits. The trees are shrubs; the shrubs are stunted, and lift their heads only when sheltered. If they attempt to overtop their walls, they are decapitated by the wind. A Mountain Ash and an Elder had grown to a small size in the garden of a minister at Sandsting—the denominations are exceedingly well represented in Shetland, and there are several 'ministers' in most parishes—and as those birds which prefer nesting in trees are put to great shifts, each of the above-named specimens was graced by a crow's nest.

It would be easy to write an essay on the Elder—that tree of ill-omen, on which no woman of the superstitious North would hang her cradle and its precious contents when she went afield to work, whose wood was carefully avoided in the making of household articles, and whose peculiar demon, the Elder-Witch, was one of the worst of an indifferent tribe. These, however, are old-world-stories, and I am able to praise the Elder as the hardiest shrub of Shetland, and the one which, in spite of its large leaves, is best suited to exposed aspects, and forms the hardiest living shelter-fence. When planted for the purpose of shelter, it is invariably protected by a wall when young, and on looking over the fence, it is pretty sure to lose its top in the manner already described. Some of the best Elder fences I saw, as well as some of the best farming, were in Unst; and having been firmly established by the skill and perseverance of an industrious small farmer, they proved sufficient, in regard to shelter and defence, for the little enclosures in which the good man's calves and cattle were grazing.

In searching for the reasons why the Elder proves itself the hardiest of shrubs, we meet with one of the 'mysteries' of natural history. As a tree of the North, it has become habituated to cold, but it does not appear that its power of such resistance can be detected in the structure and anatomy of the plant. Constitution and vitality are powers which greatly prolong life, but we cannot at present reach the source of these endowments by dissection.

The roots of the Elder are, however, particularly numerous and vigorous, which may, perhaps, in some degree, indicate the existence of the powers referred to. But we are here on ground which the ablest botanists are not yet able to venture upon freely, and, when nothing better offers, the arboriculturist must be content with unexplained facts, and with such knowledge as experience teaches.

H. EVERSHED.

BEAUTIES OF BRITISH TREES.

THE ROWAN (*Pyrus aucuparia*) is the most graceful tree of the genus to which it belongs. Like the Pear and the Apple, a member of the Rosaceous genus *Pyrus*, characterised by its apple-like fruits, or 'pomes,' with a cartilaginous 'core' or 'endocarp,' the Rowan, together with the White Beam and the Services, forms the sub-genus *Sorbus*, distinguished by having their small white flowers in branched clusters, technically known as 'cymes,' which are followed by small fruits containing but few seeds. The small trees forming this group are rather closely allied to one another, the Rowan, indeed, being sometimes termed the 'Fowlers' Service-tree,' though perhaps its best-known name is now the somewhat misleading one of 'Mountain Ash.' Its name of Rowan has, somewhat improbably, been derived from the roan colour of the bark, but there can be little doubt that it is to this grey and smooth rind, its graceful, ascending branches and pinnate leaves, that it owes the name of Ash. Even its clusters of white blossoms resemble at a distance those of *Fraxinus ornus*, the Flowering or Manna Ash, but the true Ash trees have no relationship to these Rosaceous plants. Whilst the White Beam and the Wild Service are also common in rocky, hilly, or even mountainous situations, it is especially the Rowan that rejoices in bleak rocky crags, overhanging the gills and becks of our mountains. It grows at an altitude of 2,600 feet in the Scotch Highlands, and so well deserves the prefix 'Mountain' to its name. Having a wan-hued bark and lurid fruit, and growing in wild woodland and moor, it seems to have been formerly used by witches in divination, and its name 'Rowan' is said to be connected with the Gothic word 'run,' a whisper, a mystery, divination, or a magic letter, from 'runen,' to know. Homœopathy is a great deal older than the time of Hahnemann, so that the Mountain Ash became of high repute as a protection against witchcraft, as witness the proverb—

> 'Rowan tree and red thread
> Put the witches to their speed.'

It was, therefore, planted near cow-houses and stables; perhaps because the weird sisters were more given to attack the cattle than their owners, or, perhaps, as in the case of the House-leek planted on similar buildings as a protection from lightning, because the frugal farmer thought more of the safety of his stock than of that of his family.

The Mountain Ash grows from ten to thirty feet high, with alternate ascending branches generally arranged in a lax manner that in itself gives an air of negligent grace and lightness to the tree, which is enhanced by the colouring and form of bark, leaf, blossom and fruit. The leaves are what is known as 'pinnate,' being, as a whole, some six or eight inches in length, but made up of from thirteen to seventeen leaflets, *i.e.*, one terminal one and from twelve to sixteen in pairs. Each leaflet is from one to two inches in length and about one-third as broad, with a coarsely toothed margin and an acute point. They are at first downy on their under-surfaces, and though they lose this character as they mature, they remain paler on that side and are fringed with hairs along their chief veins. When the foliage is newly expanded in May, and the gracefully cut, bright green leaflets turn in the breeze, exhibiting their pallid lower surfaces, they certainly form a distinct charm in themselves apart from the contrasting ashen bark and the creamy clusters of blossom that appear at this period.

SPRAY OF THE WILD SERVICE TREE. (*Pyrus torminalis.*)

The individual flowers are very small, only one-third of an inch across; but they are crowded into a nearly flat or 'corymbose,' 'cyme,' generally nearly six inches across, so that they gain by being massed together the conspicuousness that they do not possess individually.

It is, however, undoubtedly, after these blossoms have fallen in June and July, when the little hawthorn-like fruits, or miniature apples have, in August and September, turned from unnoticed greenness to a remarkable shade of scarlet, that the graces of the Rowan force themselves upon our notice. Then, as Wordsworth says:—

> 'The Mountain Ash
> No eye can overlook, when, 'mid a grove
> Of yet unfaded trees, she lifts her head,
> Deck'd with autumnal berries that outshine
> Spring's richest blossoms.'

The poet here notices the fact, an important one from the point of view of those planting for picturesque effects in form and colour, that the berries of the Mountain Ash turn colour whilst most of our forest trees still retain their foliage in its summer green. Their hue is not the blood red of the Guelder-Rose, or the crimson often seen in the haws of the Whitethorn, but a less common tint containing a considerable admixture of yellow, a scarlet sometimes matched in the hips of the Rose. If permitted to do so, the berries will stay on the tree until the leaves have changed colour and fallen; but, though the not unwholsome acid fruits, formerly distilled, are now unmolested by man, they are peculiar favourites with the birds. Hence it is that the tree obtains its specific name, '*Aucuparia*,' and the English name of Fowlers' Service-tree, since the berries were formerly used as a lure by bird-catchers (Latiné *auceps*). The name 'Service,' which has nothing to do with the ordinary use of that word, will have to be explained presently. The flesh of the fruit is a bright orange-yellow, as may often be seen in the many wounds the beaks of innumerable finches and thrushes will make in the riddled clusters, and the core is so hard as to connect the species with the Medlar and the Hawthorn.

The leaves, in turning, most frequently become yellowish, and decay on the tree to an unornamental brown; but in exceptional situations, or in very favourable autumns, perhaps mostly when the end of September and the beginning of October are unusually dry, they, too, become red, and then, as a poetess has said:

> 'The scarlet Rowan seems to mock
> The red sea-coral; berries, leaves, and all,
> Light swinging from the moist green shining rock,
> Which beds the foaming torrent's turbid fall.'

The writer has here happily suggested an appropriate situation for the tree. Its light and graceful habit should be sufficiently free from other trees to be well seen; indeed, hardy as it is for any exposure, its outline of branch and leaf will show well against the sky, whilst the grey bark will contrast well with the lush green growth by the stream, or with the changing tints of moorland, bracken and heather. The gay verdure of the young leaves and the creamy clusters of blossoms, or the bright autumn fruit, will equally well contrast with the severity of bare stone in the browns or greys of the natural rockery. In such spots, with Guelder-Rose, or Silver Birch, should the Mountain Ash be planted.

The Wild Service-tree (*Pyrus torminalis*). A rarer and less known member of the genus than the Mountain Ash, the Wild Service-tree has some beauties of its own. It is known as the Wild Service-tree, to distinguish it from *Pyrus sorbus* or *domestica*, a species now extinct in England, but of which one tree grew formerly in the heart of Wyre Forest, in Worcestershire. This true Service-tree had pinnate leaves like those of the Mountain Ash, but its fruits resembled miniature Pears. On the Continent, where it is common, it is valued for its hard wood. The Wild Service-tree, on the other hand, is more nearly related to the White Beam (*P. aria*), having simple, lobed leaves and a greenish-brown fruit, generally sub-globose, though sometimes slightly pear-shaped. The name 'Service' is from the Latin *cerevisia*, beer, the trees containing a bitter astringent principle that caused them to be used, not only medicinally in dysentery, but also, before the time of hops, in brewing.

SPRAY OF MOUNTAIN ASH. (*Pyrus aucuparia.*)

The Wild Service is an uncommon tree in the south of England and Wales, forming a small bush on the precipitous limestone cliffs that overhang 'the sylvan Wye,' or small standard trees in the woodlands of

Sussex. It is of rather a close habit in branching, and both the young branches and the under-surfaces of the young leaves are downy, though they become afterwards smooth. The leaves are broadly ovate or triangular in general outline, slightly heart-shaped at the insertion of the leaf-stalk, and divided at the margin into from six to ten well-marked spreading lobes, with acute points and serrate edges. The whole leaf is about three inches in length. The numerous white flowers are slightly larger than those of the Mountain Ash, being half-an-inch across, and they also gain in beauty by the greater looseness of their grouping in the often-branched corymbs which they form. The small fruits are inconspicuous in their colouring, but agreeably acid in flavour, and sometimes find their way not only into country markets, but to London, being known from their mottled green and brown as 'Chequers.'

The tree may well be added to the shrubbery, especially on a poor soil, though it cannot lay claim to the distinctive grace of the Rowan, nor perhaps even rival the attractions of the White Beam.

G. S. Boulger.

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PLANTING ENTERPRISE IN THE WEST INDIES.[*]

I.

In accepting the kind invitation of the Council to read a paper before the Royal Colonial Institute, I have been actuated simply by a desire to bring before its members, and through them before Englishmen generally, some points of interest connected with the present position of planting industries in our West India possessions.

It may be as well for me also to mention that, in coming before you this evening to treat of these industries, I do not wish to appear in the capacity of an advocate of any particular views or doctrines, nor do I desire to bring up or discuss any of the numerous problems of a purely controversial character, which have from time to time arisen in connection with the treatment of West India questions. Such problems, however interesting they may be to the politician and reformer, do not necessarily fall within the range of my subject; and hence I believe I shall best carry out the objects of the Institute, as well as endeavour to do justice to the great interests involved in the topic of my paper, if I confine myself chiefly to a statement of facts as bearing upon the position and prospects of planting enterprise in the West Indies, and to a simple enumeration and description of such industries as have more particularly come under my notice.

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[*] A Paper read before the Royal Colonial Institute—his Grace the Duke of Manchester, K.P. (Chairman of the Council), in the Chair—by D. Morris, Esq., M.A., F.L.S., F.G.S., Director of Public Gardens and Plantations, Jamaica. Reprinted by permission of the Council of the Royal Colonial Institute.

These West Indian industries, many of them new ones, are seemingly in course of being gradually extended and improved; and, as the general opinion with regard to the West Indies is that they are either utterly ruined, or in a state of stagnation and decay, I would ask your kind indulgence while I endeavour to place before you the results of careful inquiry and observation, and give my reasons for sharing the belief that most of our West India possessions have already passed through the worst of their depression and troubles, and are beginning to enter upon a new and more prosperous career. And, if I am able to place my facts before you in such a manner as to enlist your interest and sympathy in favour of these oldest of our Colonial possessions, I shall feel that my humble effort has not been in vain.

At the outset, however, I desire, as one who has felt the value and had many opportunities of judging of the results, to express my thanks for the facilities afforded by the Royal Colonial Institute for the discussion of questions affecting the well-being of the Colonies, no less than for its consistent and powerful advocacy of Colonial interests generally. I am sure I do but re-echo the sentiment of every colonist and planter, not only in the West Indies, but in every Colony throughout the Empire, when I earnestly desire that the operations and scope of the Royal Colonial Institute, in relation to Colonial industries, may become, day by day, of a more permanent and extensive character, and when I heartily wish it God-speed in its noble work.

I mentioned, just now, that the general impression with regard to the West Indies is that they are either in a state of stagnation or decay. No doubt, owing to the abolition of slavery, and subsequently to the low prices of sugar, brought about by unequal competition with bounty-fed beet sugar, the West Indian sugar-planters have had to contend with difficulties unequalled in the history of any single industry. Is it, therefore, a matter of surprise that the sugar islands of the West, depending almost entirely for their prosperity and success on a single industry, when that industry was completely crushed and paralyzed, should have become depressed, or that capitalists, looking upon them as hopeless, should have sought other openings for their investments?

For the last thirty or forty years the tide of emigration, as regards tropical planters, and consequently the flow of capital, has steadily set to the eastward, and thousands of men possessing capital and energy have settled on the Nilgiris, on the slopes of the Himalayas, and on the mountains of Ceylon, to cultivate tea, coffee, and cinchona. More recently they have gone still further east, to Perak, Johore, Sumatra, and Borneo.

Now, however, that the dreadful coffee-leaf disease has induced so depressing an influence in all Eastern countries, and whilst Englishmen are contemplating investing their capital in countries not under British rule, and in places so remote and so little accessible to the chief markets of the world, it seems not inappropriate to consider what lands, what facilities for culture, and what returns on capital the West Indies—within some eighteen days of England, and in close and easy communication with the vast markets of Europe and America—have to offer the pioneer and the planter.

In order to place the subject-matter of my paper before you, this evening, in as clear and as intelligible a manner as possible, I would remark that by the term 'British Possessions in the West Indies,' I wish to include the Bahamas, the whole of the British West India Islands, together with British Honduras (a dependency of Jamaica), and the Colony of British Guiana.

Both geographically, as being all in the Western tropics, as well as by their vegetable productions and planting industries, these possessions form a natural group, having a common interest in the development of the natural products of the soil—all of which are of an essentially tropical character.

Having thus defined the scope and range of my paper, and indicated its geographical limits, I would mention that I purpose, in the next place, to enter upon a brief statistical inquiry respecting the present position of our West India possessions, and endeavour to show in what respects they have advanced, or fallen back, from their position of some fifteen or twenty years ago. Following this, I will refer, as fully as my time will permit, to the planting enterprises which have been, or are in course of being, carried on in the West Indies, and indicate in what respects they offer grounds for a more hopeful view than is generally taken respecting the future of these nearest and oldest of our vast tropical possessions.

With regard to the relevancy of statistics as bearing upon the subject-matter of my paper, I may mention that, as the West Indies are essentially and purely agricultural, and as their industries and commercial relations are based upon the natural resources and productions of the soil, any carefully compiled statistics, connected with them, should indicate the extent and position of those industries, and the measure of success to which they have attained.

The British possessions in the West Indies, using the term in the sense above indicated, have a total area of nearly 100,000 square miles: that is, an extent of country nearly equal to that of New Zealand, and more than four times that of the island of Ceylon.

With regard to the population of the West Indies, it is often believed to be either stationary or declining. This, however, is by no means the case with the creole, or negro population, or even with the whites. The population of the West Indies in 1881 was 1,493,062, as compared with 1,279,507 in 1871, and 1,107,667 in 1861. This shows an increase of population equal to 16 per cent. on the returns for 10 years; and an increase of nearly 35 per cent. on those for 20 years. It would appear, therefore, that the rate of increase of population in the West Indies is much greater than that of the United Kingdom, in which the rate of increase at the census of 1881 was under 11 per cent. This large increase appears to be general, and not confined to any particular locality. Moreover, it is only very slightly influenced by coolie immigration. The total number of free and indentured coolies in the West Indies according to the latest returns, viz., those for 1882, was not quite 90,000; of these more than two-thirds, or 62,000, were in British Guiana. As compared with other British Colonies, the population of the West Indies is greater than that of any of the larger Australian Colonies; and more than three times that of New Zealand.

The total export and import trade of the West Indies in 1881, amounted to an aggregate value of nearly 17 millions—the exact figures being: exports, £8,913,014; imports, £7,746,470. This is an increase of nearly 3½ millions on the value of the export and import trade in 1866, and is nearly one-half of the total value of the export and import trade of British North America.

The annual revenue of these possessions in 1881 was £1,866,782, which, as compared with that of 1866, shows an increase of more than half a million. The public debt in 1881, incurred chiefly in the extension of railways and public works, was £2,023,913, or only a little over one year's income. Since 1881 a large reduction of this debt has taken place, especially with regard to British Guiana, which lowers the amount to about £1,586,000, or considerably less than that of twenty years.

The statistics of the several Colonies are given in the subjoined table:—

British Possessions in the West Indies.

Table showing Area, Population, Value of Exports and Imports for the Year 1881, together with Annual Revenue and Public Debt.

Colony.	Area in Square Miles.	Population, 1881.	Exports.	Imports.	Revenue.	Public Debt.
			£	£	£	£
Bahamas	5,390	43,521	114,100	168,380	41,294	57,837
Jamaica............	4,193	580,804	1,549,058	1,321,962	544,436	920,925
Honduras	7,562	27,452	247,403	201,811	43,642	—
Turks Islands ...	169	4,732	25,616	27,054	8,392	—
Windward Islands:						
St. Lucia	237	38,551	194,694	127,362	32,431	34,100
St. Vincent ...	147	40,548	141,576	129,026	30,637	2,000
Barbados	166	171,860	1,140,361	1,119,213	132,942	—
Grenada.........	133	42,403	194,280	131,985	37,176	10,780
Tobago	114	18,051	83,583	59,582	16,830	—
Leeward Islands.						
Virgin Islands	57	5,287	5,249	4,999	1,604	—
St. Christopher	68	29,137	213,080	169,688	29,909	3,200
Nevis	50	11,864	38,672	32,789	7,723	—
Antigua	170	35,244	178,582	151,883	41,583	57,432
Montserrat ...	32	10,083	35.205	25,347	5,938	3,000
Dominica	291	28,211	55,163	64,968	24,033	11,900
Trinidad	1,754	153,128	2,099,101*a*	2,226,276*b*	464,967	500,720
British Guiana...	76,000	252,186	2,597,291	1,784,145	403,245	422,019
Total	96,533	1,493,062	8,913.014	7,746,470	1,866,782	2,023,913

(*a*) Includes £651,184, value of bullion and specie exported.
(*b*) Includes £80,000, value of cacao, coffee, &c., in transit, and £554,217 bullion and specie imported.
The exports and imports for Jamaica are for the year 1881-82.

As regards the distribution of the trade of the West Indies, the value of the exports, including bullion and specie to the United Kingdom for the year 1881, was £5,015,964, and the value of the imports from the United Kingdom, during the same period, was £3,407,765. Next to the Mother Country the United States of America, as might naturally be expected, appear to secure the largest proportion of the West Indian trade. I am unable to give a detailed statement of the trade between each Colony and the United States, but as regards Jamaica, Barbados, Trinidad, and British Guiana the figures are as follows:—

Value of the Imports of Jamaica, Barbados, Trinidad, and British Guiana (including (Bullion and Specie), distinguishing the Principal Countries.

Colony.	Total Imports.	From the United Kingdom.	From the United States of America.	From British North America.	From other Countries.
	£	£	£	£	£
Jamaica	1,321,962	646,052	549,724	147,376	50,517
Barbados	1,119,213	433,840	451,385	101,584	232,404
Trinidad.........	2,226,276	828,444	397,854	72,176	927,802
British Guiana	1,784,145	833,847	397,806	88,527	463,965*a*
Total	6,451,596	2,742,183	1,796,769	409,663	1,674,688

a Includes £241,047 for rice from India.

Value of the Exports of Jamaica, Barbados, Trinadad, and British Guiana (including Bullion and Specie), distinguishing the Principal Countries.

Colony.	Total Exports.	To the United Kingdom.	To the, United States of America.	To British North America.	To other Countries.
	£	£	£	£	£
Jamaica	1,549,058	783,205	223,585	73,450	468,818
Barbados	1,140.361	454,601	273,766	207,629	204,365
Trinidad	2,099,101	995,925	193,703	84,541	824,932
British Guiana	2,597,291	1,771,441	514,101	73,733	238,016
Total	7,385,811	4,005,172	1,205.155	439,353	1,736,131*a*

a Includes £323,500 for cacao exported to France.

In a comparative statement extending back some ten years, it is very noticeable that the United States and Canada are yearly receiving a larger proportion of the West India exports in the form of sugar and tropical fruits, while the export trade with the Mother Country is gradually decreasing. The same may be said of the import trade, which with the United States and Canada, in the form of flour, dried and salted fish, lumber and canned goods, is assuming important proportions.

Whether this distribution of trade will continue in the same directions remains to be seen. Judging simply from the geographical position of our West India possessions, and their proximity to the prosperous and rapidly increasing populations of the United States and the Dominion of Canada, and the fact that they can supply most conveniently and cheaply most of the Colonial produce desired and in great demand in these countries, the natural inference is that it will probably do so. There are some, however, who believe that when the Panama Canal is opened, not only will the trade and prosperity of many of the West India Islands, and especially of Jamaica, considerably improve, but they will be brought into more direct and rapid communication with the Mother Country, and thus to a great extent the distribution of their export and import trade will be materially affected.

To understand aright the relative positions and capabilities of our West India possessions, it is necessary to remark that, with the exception of the continental elements—British Honduras and British Guiana—they are composed of numerous islands 'varying in size from mere coral islets—dotted like stepping-stones for giants over the Caribbean Sea—to a fair and fertile land as large as Yorkshire.' Without entering upon any scientific details, it may be mentioned that most of the smaller islands are of organic origin, being composed of coral structures and the *débris* of marine shells and forms upheaved to the surface by subterranean forces: others are purely volcanic, yielding, when disintegrated, soils of great richness and fertility:

whilst the largest and most important islands, such as Jamaica and Trinidad, have been largely formed by alluvial deposits resting upon or combined with volcanic rocks indicating great alternating periods of elevation and depression. The physical features of these islands are chiefly indicated by bold, rugged mountains, deep, well-sheltered valleys, with a fringe of gently sloping, rich, alluvial plains, varying in breadth from one to twenty miles near the sea, forming the lowlands. The rivers, fed by abundant tropical rains, are very numerous, but small and rapid.

The mineral wealth of our West India possessions is very small: in fact, with the exception of some sulphur in the Lesser Antilles, traces of copper in Jamaica and the Virgin Islands, and asphalte in Trinidad, they may be said to be entirely devoid of mineral resources. The true wealth of these possessions lies in the characteristics and products of the soil; and, without exception, in this respect they afford means of development and of permanency of prosperity equal to any in the world.

Such resources, under any circumstances, should afford hopes for the future, but when combined with an advantageous geographical position, with a splendid and salubrious climate, with abundant springs, with varying altitudes of land suitable for cultivation, and with a large and increasing indigenous population, they should attract the serious attention of Englishmen; and I doubt not, when fully understood and generously and wisely treated, such resources will ultimately lay the foundations of great and abiding industries.

If I have been rightly understood in the general tendency of my remarks so far, I shall have led you to look for the true development of our West India possessions, not in their mineral wealth, not in any large stores of timber, nor in any manufacturing industries, but simply, in the natural products and resources of the soil; and to secure the full development of these there are wanting only capital and labour intelligently and wisely used, and proportionate and suitable to the ends in view.

The staple industry of the West Indies for more than two centuries has been sugar, with its secondary products, rum and molasses. In spite of the disorganization of the labour market consequent upon the abolition of slavery, and in spite of the unequal competition of beet-sugar, the sugar-cane still remains the chief industrial plant of our West India possessions. Not only that, but the West Indies, at present, produce more sugar than all the other British possessions put together. For instance, during the year 1881, the quantity of raw sugar exported from all the British possessions amounted to 7,833,504 cwts. Of this 4,697,445 cwts., or more than two-thirds, were produced by our possessions in the West Indies: the remainder, or 3,136,059 cwts., being the produce of Mauritius, India, Natal, Fiji, &c.

The chief sugar-producing Colonies in the West Indies are British Guiana, where sugar, molasses, and rum form 92 per cent. of the annual value of the exports; Barbados, where sugar and molasses contribute nearly 94 per cent. of the exports; Jamaica, where sugar and rum form 62 per cent. of the exports; and Trinidad, where sugar and molasses contribute about 56 per cent. of the exports.

The best appliances and the largest sugar estates are found in British Guiana and Trinidad; and the establishment of *usines*, or central factories in these Colonies, has not only greatly improved the quality of the sugar, but it has placed planting operations on a more elaborate and extensive scale.

In Barbados the estates are small, but so highly cultivated that the whole island looks like a beautiful garden. In Jamaica the sugar estates may not compare favourably, either in culture or in mechanical appliances, with those of its neighbours, but the Jamaica sugar-planter has a considerable advantage over all others in the superior quality and high prices obtained for his rum, which reaches an annual export value nearly equal to one-half of that of sugar.

Although, owing to a succession of bad seasons and drought, other crops had not done so well in Jamaica, the sugar crop of 1881-82 was the largest for many years. The exports were: sugar, 38,392 hhds., of the value of £614,283; and rum, 22,742 phns., of the value of £295,645; the total value of sugar and rum being £909,928. This is an increase on the exported value of these articles, as compared with 1880-1, to the extent of £398,621. It is possible, as claimed by some, that the reduction in the number of rat-eaten canes, brought about by the acclimatization of the mungoose in Jamaica, may have contributed something to this large increase; but the bulk of the increase is no doubt due to a combination of circumstances favourable for the moment to the sugar estates, but not so favourable to other industries.

During the last few years many efforts have been made to economize the cost of the production of sugar, and so bring it into favourable competition with beet and other sugars. Possibly, next to improved machinery and a more rational and scientific treatment of the soil, nothing can be more conducive to the success of our West Indian sugar estates than the introduction of new varieties of canes, to replace or supplement those which have been so long and so persistently cultivated within the same areas. With such varying conditions of soil and climate as exist in the West Indies, it may naturally be expected that numerous varieties of canes are required to enable the planter to obtain the best results. In other words, it is believed that with the sugar-cane, as with all other plants, the continuous cultivation of the same kinds on the same lands must result in reducing their health and vigour, and, consequently, the quantity and value of the produce. Where estates have no nurseries, and tops for planting are taken from weak and practically abandoned canes, the general character of the cultivation must be gradually lowered, even in the best soils. No plan can be recommended so likely to overcome this as the introduction, from time to time, of new kinds of sugar-canes which are the result of careful selection and cultivation in more favoured countries.

INTERNATIONAL FORESTRY EXHIBITION.

IT will doubtless be interesting to many of our readers if we re-print the following 'Classification' circular, issued by the Committee, from which they will be able to form a good idea of the comprehensive scope of the Exhibition:—

CLASS I.—PRACTICAL FORESTRY.

1. Implements and Tools used in Forestry, Draining, Enclosing, and Surveying Instruments, Chains, Dendrometers, &c.
2. Models of Foresters' Huts, Drying Sheds, Charcoal Kilns, Timber Slips, Sluices, Bridges, and Weirs.
3. Plans of River Embankments, Rafts, and Appliances for floating Timber.
4. Machinery or Models for Transporting Timber and Transplanting Trees.
5. Saw-mills—Wood-working Machinery of every description, and Pulping Apparatus, in motion or otherwise.
6. Fencing Materials of all kinds, including Gates and Stiles.

CLASS II.—FOREST PRODUCE, RAW AND MANUFACTURED.

1. Collections of Timber Specimens and Ornamental Woods :
   a. Indigenous or Naturalized.
   b. Exotic.
2. Woods used for Ordnance—as Gun Carriages, &c.
3. Woods used for Railway Purposes—Natural or Prepared.
4. Wood Pavements.
5. Cooperage—Tubs, Barrels, &c.
6. Wood Carving and Turnery, with Tools used.
7. Basket and Wicker Work.
8. Fancy Woodwork, including Veneers, Parquetery, Bog Oak articles, Stained and Coloured Woods, &c.
9. Wood Engraving, with Samples of Wood.
10. Bamboos, Canes, Reeds, and Manufactures therefrom.
11. Tanning Substances—Barks, Extracts, &c.
12. Dyeing Substances—Woods, Roots, Flowers, &c.
13. Barks, including Cork.
14. Fibres, and Fibrous Substances.
15. Materials for Paper Manufacture.
16. Gums, Resins, and Gum Elastics.

17. Wood Oils and Varnishes—including Lac of Sorts.
18. Drugs, Foods, Spices.
19. Charcoal for Gunpowder, Tinder, &c.
20. Peat and its Products.
21. Cones, Seeds, and Fruits of Trees and Shrubs.

CLASS III.—SCIENTIFIC FORESTRY.

1. Botanical Specimens of Forest Flora.
2. Microscopic Sections of Woods.
3. Parasites—Fungi and Lichens injurious to Trees.
4. Edible Fungi—in their natural state, or preserved.
5. Forest Fauna injurious to Woods.
6. Forest Entomology.—Useful and Noxious Insects, with Specimens illustrative of the damage by the latter.
7. Preservative Processes applied to Timber.
8. Specimens and diagrams illustrating the Geological formations adapted to the Growth of Trees.
9. Fossil Plants—Collections illustrative of the Trees of Coal Measures, &c.
10. Trees found in Bogs—Oak, Fir, &c.

CLASS IV.—ORNAMENTAL FORESTRY.

1. Growing Specimens of Rare and Ornamental Trees and Shrubs—in tubs or otherwise.
2. Rustic Work—Arbours, Bridges, Gates, Seats, &c.
3. Dried Specimens of Ornamental Objects, including Foliage, &c.

CLASS V.—ILLUSTRATIONS OF FORESTRY.

1. Paintings, Photographs, and Drawings of Remarkable or Historical Trees, Foliage, and Scenery.
2. Delineations of Trees in their Native Countries, or of Recent Introduction.
3. Illustrations showing Effects of Blight, Accident, Parasitic, Growths or any Abnormal Condition.
4. Sketches of Practical Work and Operations in the Forests.

N.B.—*Special attention is invited to this Class.*

CLASS VI.—FOREST LITERATURE AND HISTORY.

1. Reports of Forest Schools or Departments—Forest Periodicals and other publications—Manuals and Almanacks—Treatises on Measuring and Valuing Woods—Forest Floras of different countries—on Fixation of Dunes, and on Ancient or Extinct Forests.
2. (*a.*) Working Plans of Forests and Plantations, Valuations and Surveys of Estates, &c.
   (*b.*) Charts illustrative of the Geographical Distribution of Forest Trees, and their Altitude.
   (*c.*) Maps illustrating the distribution of Forest produce, forming articles of British Commerce.
   (*d.*) Forest Book-keeping and Accounts.

N.B.—*Special attention is invited to Section 2.*

CLASS VII.—ESSAYS AND REPORTS.

Essays and Reports on Specific Subjects, for which Premiums are offered as per separate Schedule.

CLASS VIII.—LOAN COLLECTIONS.

Collections within the scope of the foregoing Classes—for example, illustrating the Fauna, Flora, or Forest produce of a Province or District—would be acceptable.

CLASS IX.

Economic Condition of Foresters and Woodmen

CLASS X.—MISCELLANEOUS.

Articles not particularised in the above Divisions, if bearing on the objects of the Exhibition, are admissible, with the sanction of the Executive Committee.

Official London Agent: WILLIAM H. RIDER, Esq., 14, Bartholomew Close, E.C.

The following are the regulations for exhibitors:—

1. The Exhibition is intended to include everything connected with, or illustrative of, the Forest Products of the World, and will be open to exhibitors from all countries.

See Classification of Exhibits.

2. Entries close on 1st March, 1884. All exhibits must be intimated by a certificate of entry, forms of which will be issued on application to the Secretary.

3. The Committee reserve power to restrict the space applied for, or to decline any application, in either of which cases the Secretary will, as soon as practicable, notify the same to the applicant.

4. Exhibitors will be charged one shilling per square foot of floor space. Open air space free. Cases for exhibits must not exceed 10 feet in height.

A Committee has been appointed to consider in *special cases* a reduction or remission of the above charge for space.

5. Exhibitors must pay all expense of transit, delivery, fixing, and removing their exhibits.

6. All packages containing articles intended for exhibition must bear the distinctive mark, I. F. E., EDINBURGH, in red paint; and they must also have painted on them, the name and number (which will be sent on allocation of space) of the exhibitor. The way-bill must accompany all packages, and contain the name of the exhibitor, his number, and address.

7. Arrangements will be made by the Committee for the reception of exhibits at a date to be afterwards fixed.

8. The Committee will not be liable for any loss or damage, from whatever cause, which exhibits may sustain in transit, at the Exhibition, or otherwise.

9. Exhibitors must provide, either personally or by their agent, for the reception, setting up, and removal of their exhibits, and the verification of the same; in default whereof, the Committee reserve the right of doing whatever they may consider necessary at the expense of the exhibitor.

10. Exhibitors of machinery requiring the use of water, gas, or steam, must state, on making their entries, the quantity of water, gas, or steam which will be required. Exhibitors of machinery in motion must state the rate of speed at which it is to be driven. The furnishing of all connections, shafting, pulleys, belting, &c., must be at the expense of the exhibitor. Gas, water, or steam power will be supplied on terms to be hereafter arranged by the Committee, and be under their entire control.

11. Medals, money prizes, and diplomas for exhibits and essays, will be awarded by competent jurors.

12. No photographs, copies, or other reproductions of any objects exhibited, will be permitted to be taken without the consent of the Committee and the exhibitor.

13. Contributors to the Loan Department are requested to communicate with the Secretary, who will supply special forms to be filled up by them. Free space will be given for loan collections and workmen's approved models.

14. No exhibitor will be allowed to transfer any allotment, or to allow any other than his own duly admitted exhibits to be placed thereon, except by permission of the Committee.

15. No articles can be removed before the close of the Exhibition, unless perishable, regarding which special arrangements will be made.

16. To ensure uniformity of decoration and general effect, no exhibitor will be allowed to put up any sign, flag, banner, or other kind of decoration or erection, without the approval of the Committee.

17. Exhibitors will be required to provide all necessary attendance, and to keep their stands and exhibits properly cleaned, and in good order, during the whole period of the Exhibition.

18. Exhibitors may mark the selling price of the articles exhibited complete, for the information of the Jurors and Visitors.

19. No placards will be permitted either within the Exhibition or on the enclosure, except by special permission of the Committee. No handbills, newspapers, books, &c., are allowed to be sold in the Exhibition without their sanction.

20. All fulminating and explosive substances, and all dangerous materials, are absolutely forbidden to be sent.

21. All cases must be unpacked as soon as received, and the empty cases taken away by the exhibitors or their agents.

22. The Committee reserve the sole right of compiling and publishing a Catalogue of Exhibits, which can be purchased *only* within the Exhibition.

23. Smoking is strictly prohibited within the Exhibition buildings.

24. All persons admitted to the Exhibition shall be subject to the rules and orders of the Committee.

G. CADELL, *Secretary*,
3, GEORGE IV. BRIDGE, EDINBURGH.

Note.—The Committee will endeavour to obtain from the various British Railway Companies special terms for the conveyance of exhibits to and from the Exhibition, and should they succeed, such arrangements will be duly intimated to exhibitors. The Committee, however, do not undertake any responsibility between the Railway Companies and exhibitors with reference to the despatch, transmission, delivery, or return of exhibits.

TEREBENE SOAP.

THAT the uses of trees are innumerable is a fact long established; but the circumstance that one of the most useful of the orders of trees—a Pine—produces an article of exceptional excellence is pleasantly brought to our mind on opening a box which Messrs. F. S. Cleaver & Sons have sent to us of their now well-known 'Terebene Soap.' We confess that the odour which is emitted on opening a box of this soap is delightfully fragrant, and the essence which gives its especial character to this perfume suggests its origin, for it is produced by chemical means from the juice, or, strictly speaking, the sap of the long-leaved Pine, *Pinus palustris*, or *Pinus australis*, or the Southern Pine, as it is, perhaps, more frequently called. The tree, however, has many synonyms, such as, botanically, *Pinus americana palustris*, *Pinus* *serotina*, and in common parlance, Yellow Pine, Pitch Pine, and Broom Pine, Red Pine, and Georgia Pitch Pine.

Messrs. Cleaver & Sons state that their 'Terebene' as designed by Dr. Francis T. Bond, F.C.S., Medical Officer of Health for the Gloucestershire Combined Sanitary District, is 'a liquid with a somewhat camphoraceous smell' in mass, resembling that of oil of Thyme, and is obtained 'by chemical means from the juice of the long-leaved Pine (*Pinus palustris*) and some other coniferous plants.' When exposed to the air, this substance, they add, 'volatilizes, emitting an odour of a fragrant and agreeable character, which, when diffused through the atmosphere, somewhat recalls that of Pine wood. When thus exposed it acts energetically upon the oxygen of the air, developing ozone in it, and at the same time becoming itself charged with peroxide of hydrogen (antozone of Schönbein).'

They further state that, 'When added to any decomposing and offensive matter, Terebene acts as a powerful deodorant. It produces the same effect upon a foul atmosphere, not simply by masking the offensive smell by its own odour, as is the case with carbolic acid and other similar strongly smelling disinfectants, but by developing in the air an agent (ozone) which rapidly oxydises and destroys the malodorous emanations. It is, therefore, truly an atmospheric purifier. Terebene has also marked antiseptic power, and when added to decomposable matters arrests putrefaction for a considerable time. It is *non-poisonous*, and may be taken internally. It may be noted in connection with the resemblance of the odour of Terebene vapour to that of Pine wood, referred to above, that Dr. Day, of Geelong, has in several publications drawn special attention to the disinfecting properties of this substance, from its action as an ozoniser, and has recommended its use in the construction of hospitals for infectious diseases on that account. When Terebene is applied to a raw surface, such as that of a wound, it acts as a stimulant to healthy growth, surfaces that have been inert exhibiting under its influence a rapid tendency to healing. It may also be used in the same way in some affections of the skin, and as a topical application in scarlatina and other forms of bad sore throat, diphtheria, &c. From the above statement it will be evident that Terebene is calculated to replace carbolic acid as a deodorant and disinfectant for all ordinary purposes, having three very great advantages over it in the facts—that it is non-poisonous; that its odour, instead of being offensive, is agreeable; and that it is an atmospheric purifier.'

Before introducing his patent Terebene Soap, Mr. F. S. Cleaver has made numerous experiments, in order to satisfy himself of its practical value, and it is with the greatest confidence in its very valuable disinfecting, astringent, and purifying power—in addition to which it possesses most wonderfully cleansing properties—that it is offered to the public. In its manufacture Glycerine is combined with Terebene. It is also agreeably and innocently perfumed. The slight colouring matter used is simply palm oil, respecting the valuable properties of which no remark is necessary. As a preventive against ordinary eruptions or irritation of the skin, and for producing a clear and brilliant complexion, this toilet soap has been strongly recommended for daily use; in fact, in all cases such as the foregoing it will be found invaluable, and for use by medical practitioners in removing all unpleasant odour from the hands; also in cases of chapped skin the Terebene soap will be found most beneficial.

We fancy that to our readers—especially from its intimate relation to the subject in which they are specially interested—this excellent article of manufacture must commend itself.

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FORESTAL NOTES.—PINUS AUSTRIACA.

IN the December No. of 'Forestry,' Mr. W. Lipscomb calls attention to an instance—solitary, within his experience—of the failure of a plantation of *Pinus Austriaca*, its decay dating from the spring of 1880, when it was eighteen years old.

I am sorry to say I can present many instances of the same fact, the only difference being that here the young trees have not waited till the age of eighteen before showing symptoms of weakness. Our soil (Salbris, Loir et Cher) is mostly dry sand, more or less heathy, and very acid, the calcareous element being entirely absent, so that no agriculture can succeed without the application of lime. The Sologne region is a plain almost quite flat, and our district has an altitude of about 400 feet.

The Austrian Pine seems to be able to stand any amount of drought, heat, and barrenness, provided there be a certain amount of lime in the soil. It flourishes even where this element is excessive. In Lower Austria, besides its natural region, the hills, it covers vast plains of chalky gravel where nothing else can grow; and it is successfully planted on the arid wastes of Champagne Pouilleuse—between Chalons and Troyes—where the soil is a fine white dust of nearly the same composition. But here it seems to require a fairly moist and clean soil to come away with any freedom, even at its youngest age. Under the best circumstances its growth is much inferior to that of *Pinus sylvestris*, and wherever the two Pines are grown together, the Austrian is soon suppressed and smothered by the more rapid and vigorous development of its companion.

The acidity of heath soil it seems particularly to dislike. Its cover and roots are powerless there to take possession of the ground, and kill off, in the struggle of natural selection, the heather and other weeds that occupy the soil, so that its vegetation is miserable; and this although its cover, when well developed, appears to be thick enough.

The young *sylvestris* has, in a remarkable degree, this power of killing off noxious vegetation and taking undisturbed possession of the ground. As an instance, nine years ago I put down two-year-old plants in heather nearly a yard high, which their growth has gradually smothered, until the soil is now as clean as a house floor.

I think it may be useful to state the fact of *Pinus austriaca's* uselessness in such soils, as a belief in its being a universally hardy tree might lead in some cases to serious disappointment. I believe all continental experience—as far as I have heard—tends to show that it never develops really vigorously except on soil that has a fair proportion of the calcareous element. I should be glad to know if any clear example to the contrary exists in the United Kingdom, under its more temperate climate; and it would be interesting to all your readers, if Mr. Lipscomb could kindly give us some description of the chemical composition of the soils in which his plantations of *Austriaca* succeeded, and of that in which they fell away.

In this country the Austrian Pines, though mostly very young, were not injured in the least by the unprecedented frosts of 1879-80, which attained 20° below zero of Fahrenheit, and which destroyed, besides most fruit trees and many ornamental species, all the woods of Cluster Pine in the centre of France. *Austriaca* was much damaged, however, by an invasion of insects—*Curculio pini* on the young plants, *hylesinus piniperda* on trees over eight years old—attracted and propagated by the immense amount of dying wood with which these terrible frosts had covered the country. *Sylvestris*, which was equally attacked, bore the damage much better, from the superior strength of its particularly hardy constitution. It is the German variety that is usually cultivated here, and we find its growth remarkably strong and healthy, although, unfortunately, *some* trees are of an irregular habit, which we attribute to neglect of careful selection of the seed from the straightest growing trees, and of inquiry into that important matter on the part of the nurserymen that rear the plants.

I should be much obliged if some of the contributors to 'FORESTRY' could kindly give me an account of the special leading characteristics of the true Highland Pine, which I am now growing from seed, and the points in which lies its superiority to the foreign varieties, and let us know, in particular, if it usually grows straight without being crowded. I confess that here, if the growth of the trees were more equally straight (and this might, I should think, be obtained by careful selection of the seed-bearers), we could desire nothing better—as far as vigour and rapidity of growth are concerned—than the German variety. I have some young trees, twelve years old now, that are growing about three feet every year, and in very poor soil. Although I have not visited the forests of Germany, I should think the Germans, who are confessedly by far the best foresters in the world, would not continue to cultivate their variety if it were destitute of merit. DAVID CANNON.

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INSECT PREVENTION.*

I.

IN the office which I have the honour of holding as your Special Lecturer on Economic Entomology, I have felt that as I have only occasionally the pleasure of addressing you it was, perhaps, best at first to take some such special attacks as those of wireworm, or turnip-fly, or such detached facts relative to the habits of injurious insects as might be of service even considered separately. But in matters of insect prevention, although it is very useful to know precisely what methods are thought the best for preventing or remedying each *special* kind of attack, it is a great deal more so to have in our minds a principle or rule which will apply equally to a great many kinds, and thus enable us to help ourselves as occasion may require; and to-day I wish to offer some observations on one of the most important principles of prevention—that of the *removal of winter shelters.* In other countries insects often sweep on in hordes, devastating all before them, but here in these islands (excepting from their neighbourly visits) our insect troubles arise in great part from the last brood of the previous summer's pests, which will in many cases have sought a winter shelter, or have been placed in it in the egg form, at or near the root of their food plant. We need not say anything again about the extent to which turnip-fly shelters during winter, but so also does its near ally, the mustard-beetle, and although we have at present only a few observations on the *Sitona*, or pea and clover weevil, these point to stubble as being one of the autumn shelters from which they start attack on the next spring's clover. The autumn daddy-longlegs provide us, in pasture land and clover leys, with the leather-jacket grubs, which people the broken-up ground with the devourers of the next crop, and it is not for us, I am sure, considering the light that has been thrown on the subject from observations taken here, to despair at all of turning out the wheat midge, *cecidomyia tritici*, in its larval state, as 'red maggot,' from its autumn and winter shelter at the roots of stubble and grass. These are the points which seem desirable to observe to-day; to note just so much of the habits of these pests as may be a guide where to look for them, and also from the methods of treatment which have been found to answer in some cases to see how much more could be carried out. There are some few points in habits or conditions which many of these crop attackers have in common in their winter state. They are *hybernating*. That does not mean that they are under the influence of cold. They may or may not be. But even if they are frozen stiff, this, as far as we know (and in some cases we know it with certainty), will not do them any harm, so long as the freezing takes place in their own chosen or formed winter shelter. We may rather describe hybernation as a winter torpor, a long rest for the perfect insect; and a state in which the time of development of many caterpillars and chrysalids, which would have come to maturity in a few weeks in summer, is prolonged, so that they remain unchanged until their food plants are ready for them, or for the insect they turn to in the following spring. When they are thus in their winter shelters we have many of them at our disposal, and by care previous to this date, we may in some degree prevent these various creatures establishing themselves in legions wherever they may choose. Daddy-longlegs rank with our worst crop pests, and the great appearance of these flies towards autumn shows us without any need of further teaching when the greatest quantity of eggs are laid. In the present year (1883) it was just about the last week in August that letters began to be sent noticing the prevalence of the flies, and desiring means of prevention. We may see these flies on meadow land, and especially where from the grass or herbage not being grazed down, or being damp or over-shadowed, it is long and rank, and afterwards, when pasture or clover ley is broken up, we find the consequence of the daddy-longlegs having made it their home. The ground is, or very likely is, swarming with leather-jackets, with the grubs of the daddy-longlegs, scientifically the larvæ of various kinds of *Tipula*. These grubs are not very long-lived, those from the autumn-laid eggs feed and grow during the following season, until, their feeding time being over, they change some time during the summer into chrysalids, and thence (shortly) into daddy-longlegs. Therefore we have only one year's set to deal with at a time. It is not as with wireworms or with cockchafer grubs, where we may have not only those of the previous autumn, but possibly those of one or two or three preceding autumns also to deal with. If we can by any means keep the daddylong-legs from infesting pasture or ley in the one autumn that we may be passing through, we shall, I believe I may say, be secure from attacks of leather-jacket grubs on that ground in the following spring. We know many of the common measures of prevention very well, such as draining wet meadows, rough-mowing neglected herbage, paring and burning, and other operations, simple, or expensive and troublesome, as the case may be, but judging from the widespread amount of attack in this past year, something more is needed, and I wish to submit to you whether much the same treatment which we know answers in lessening wireworm attack would not be equally (or, very likely, still more) serviceable in lessening attacks of daddy-longlegs grubs. The measures of feeding sheep on land to be broken up would be useful in either case, as thus the parent insects would be to a great extent driven off, and many of the eggs and grubs destroyed. But further, as the numerous eggs of the daddy-longlegs, or Crane fly, as it is sometimes called, are stated to be laid singly either as the insect is flying or as it rests in herbage, and therefore not in any greatly protected nook, we might fairly expect to get rid of nearly all of them by destroying the herbage amongst which they lie. Also, though we know that moisture, or even thoroughly drenching the ground, does not hurt these leather-jacket grubs, yet it has been found that they might be killed by putting the infested field under sewage water for a short time. It might therefore be hoped that soddening in the wet surface caused by the presence of the sheep would be hurtful to them. In the case of dressings with salt, as we know that the leather-jacket has been found to go deeper down in the ground according to the amount of salt placed on the surface, we might expect the application to serve fully as well as a preventive for the Crane fly setting up an attack in the autumn, as we know it to do in the case of wireworm. Heavy dressings of gas lime on the land to be broken up would be as useful in all points, and possibly more so in killing the grubs, as although they have a power of going down in the ground, we have no knowledge that they can go down as deeply out of the way of danger as the wireworms do. Hot lime also would be more effective, as a dressing in breaking up land, against these than against other insects, because both as fly and grub the daddy-longlegs loves moisture, and the abstraction of this by the lime would not suit it at all. This fact of the grubs disliking drought is also brought to bear on them by such measures as thorough scarifying, even without more care in collecting and burning the rubbish than is given in regular agricultural course. The Crane flies propagate most in *undisturbed* as well as in damp land, and the thorough crumbling of the upper surface (at which the grubs find their food) lets in air so as to dry the ground into a condition unsuitable for them. These various points in the habits of such of the various kinds of Crane fly and their grubs as we suffer most from all appear to show that the autumn treatment, which we know is useful in saving next year's crops from wireworm, would be equally useful with the leather-jackets. Deep ploughing is also a means of lessening the amount of attack, for thus many of the grubs and eggs are put into such entirely unsuitable circumstances that many of them are destroyed. We are speaking chiefly to-day of autumn shelters—but just in passing we may notice that the amount of ravage of this grub, even when it is present in considerable numbers in the land, is much lessened by a condition of ground which will push on good growth, and that amongst the various special fertilizers which have been tried, guano and salt, mixed or with an addition of kainite and superphosphate, has proved very successful. Before going on to the subject of the next insect, which especially makes headquarters of our autumn stubbles, I wish to say one little word on my own behalf. Our subject to-day turns especially on how the use of particular agricultural treatment or implements act on insect life. I can tell you the habits of the insects, and how this or that treatment will act or has acted *on them*, but there is a further consideration of whether this treatment that did well in one case will be the right one in another: suitable that is to the coming crops, or many other considerations. I am very anxious you should not consider me presuming beyond my office into suggestions of agricultural treatment, but merely mentioning what measures act on these pests, which may be arranged in thoroughly practical form nowhere better than by the audience I have the honour of addressing. Another of our bad crop attackers, which we are beginning to learn is especially to be found in connection with clover and stubble in autumn, is the *Sitona*. We can hardly take one kind of this genus separately from the others, because there are so many of them nearly alike in appearance (to general observation), and those which we know best are much alike in habits. These various weevils feed on the pea, bean, and clover leaves. The *Sitona lineata* is known as the pea or bean weevil, and another kind known as the *S. puncticollis*, from the light points or spots on the body near the head, has been found more particularly amongst clover. But it was not until last year that it was made out where the weevils feed in their maggot state, and in both cases the history was traced out by agriculturists—in the case of the pea weevil, by Mr. Hart, of Kingsnorth, Kent; in the case of the clover weevil, by Mr. Christy, at Boynton Hall, near Chelmsford. It was found by carefully examining the growing plants that the maggots fed on the roots. In the case of the red clover which was infested, most of the maggots were found at or near the end of the tap-roots: in some cases large holes had been eaten, and in all cases the injured part had turned black. In a field of 24 acres which was attacked, every diseased plant that was examined about the 10th of April was found to have at least one maggot, sometimes five or six, at its roots. These maggots are very like other weevil maggots, that is, legless and much wrinkled across, and have a brownish head, with perfectly serviceable jaws. (The maggot often found in a nut gives a good idea of their general appearance.) These maggots turn to chrysalids in the earth at the roots of the attacked plants, and from these the pea, bean, or the clover root weevils appear about the latter part of June or July. We know the work of the weevils well on pea or clover leaves by the semicircular scoops which they eat away, thus often destroying the crops by double attack; the weevils at the leaves and the weevil maggots (from which a new brood of weevils will presently arise) at the roots; and, as far as we see at present, one great starting point of attack is from stubble-straws and clover. At harvest time, the *sitona* weevils are to be found sometimes in vast numbers; the bottoms of the carts and waggons, the platforms of the reapers, or the barn floors, may be found thronged with them. They have been noticed in large numbers on the wing, and thus those that have been left behind in infested fields have power to transfer themselves where they may wish. This is the time when the autumn attack appears to be set up. It was found by Mr. Christy that in the very large field of clover observed, the roots were infested by the weevil maggots *excepting where the thraves of wheat had stood in the preceding autumn*; the weather at harvest-time having been wet, the corn had stood longer on the ground than usual. This points strongly to the weevils which were seen at harvest-time laying their eggs by the clover, save where it was protected by the corn in sheaves; and the date when the weevil maggots were again observed confirms this view, for it was noticed that the roots were clear of maggots on the 21st of October, but by the last days of November they were again to be found feeding on the clover roots. The matter stands thus at present: the weevils frequent the stubble and clover, some of them hybernate and attack leafage of crops in the spring; others lay eggs and presumably die afterwards, and as we find the maggots infesting the clover roots at the beginning of winter, and also find clover plants diseased from maggot attack as early as the 23rd of March in spring, it is probable that these maggots are all one set. Our knowledge of the habits of this pest is so recent that at present we have hardly any notes of how to bring treatment to bear on them, excepting in the observations of the Rev. W. Clutterbuck, of Long Wittenham Vicarage, who noticed the pea weevil sheltered itself in the top joint of the stubble of barley, oats, or wheat. He writes: 'We traced the sometimes total loss of the crop of *trifolium* to this source, inasmuch as we found the insects in the top joint of the stubble, among which we usually drilled the *Trifolium incarnatum* without ploughing. We lightly skimmed the stubble, and so deprived the weevil of its habitat and refuge, and we believe we abated the evil.' In the cases where the clover is growing, the proper preventive of attack still needs to be found. We cannot put on the killing dressings which are suitable to land before breaking up; but, still, lesser dressings of the same chemical applications, such as lime or gas lime, would do some good by making the ground less fit for egg-laying, and also by choking up many of the hollow stems of stubble, so that the weevils could not get down them for their winter rest. Gas lime in proper amount (that is, as a fertilizer, not a destroyer) would be particularly likely to do good, as being obnoxious to the insect, and also (as being merely another form of gypsum) it would tend to promote the healthy growth of the clover. Whether, as we learn more about the workings of these maggots, we shall find that what has hitherto passed under the name of clover sickness may be in part owing to the plant failing from loss of a part of its roots, and decay of what was left in consequence of unsuspected maggot attack, as well as the purely vegetable disease, remains to be seen; but in either case the application of gas lime, of course properly exposed to atmospheric action previously, would be of use.

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* A lecture delivered at the Royal Agricultural College, Cirencester, by Eleanor A. Ormerod, Consulting Entomologist to the Royal Agricultural Society, and Special Lecturer on Economic Entomology at the Royal Agricultural College.

TREES: THEIR FORMS AND LAWS OF GROWTH.

THE vegetable kingdom, which comprises all the subjects of which botany takes cognisance, has been roughly divided into trees, shrubs, flowers, flowerless plants, and fossils. The division is convenient though arbitrary, and useful though unscientific. It is based on the general form, size, and consistence of plants, and we not do hesitate to speak of trees as though some of them are not gigantic shrubs. In doing so we notice two well-developed types of tree: the one tall of stem, columnar, with few branches, and these chiefly at top; the other bushy, spreading, somewhat round in contour, and with many branches. The first is essentially a timber tree; the second is essentially a huge shrub. Both types result from the operation of certain laws of nature called laws of growth. These laws, as we shall see by-and-by, do not cease to be laws of growth on our discovering their physical origin. Indeed, if from the sum total of our knowledge of the laws of growth we were to deduct the sum of our knowledge of physical laws that enter into it, the remainder would scarcely be sufficient to show our ignorance of that wonderful phenomenon called growth. Of physical laws we know something, but life is a physiological constant that seems to defy knowledge.

The first of the two types of tree described may be called *social*, because it results from conditions that exist only in the presence of contiguous trees. The second may be called *solitary*, because it results from conditions that exist only in the absence of contiguous trees. The first type is characteristic of a tree much in demand by the timber merchant; the second is characteristic of a tree much esteemed for public parks, avenues, parks around private mansions, and wherever a beautiful tree is possible and desirable. Both types begin life under similar conditions. A tree of either type springs from a solitary seed; it is not till after germination that the plant is subjected to those conditions that determine its typical character. To understand, therefore, how an acorn germinates is to understand how an Oak tree of either type begins life. Not only so, but to understand how any single seed with two cotyledons, or seedleaves, germinates, is to understand in a general way how all dicotyledonous plants germinate. Let us take a seed of the common garden Bean, The conditions necessary to germinate that Bean are said to be moisture, heat, oxygen, and darkness. We may reduce these to two, namely, heat and moisture. Darkness is by no means an essential condition, and the amount of oxygen necessary will be forthcoming in the water. Take a glass vessel—a toddy glass will do; fill it with water and place the Bean in it. Keep the glass in a room where it may be frequently seen, and keep the temperature of the room about summer heat. By observing what takes place within the glass we shall discover first a sensible enlargement of the seed. If we are careful, especially if we are sufficiently sceptical as to things being what they appear to be, we shall have placed more seeds than one into the glass, so that we may extract one of them and so assure ourselves that the enlargement is due to absorption of the water in the glass. The next thing we shall observe will be the radicle, or root of the young plant, protruding at a point near one end of the seed. We may doubt its being the radicle, but by-and-by our doubts will be removed by the appearing of the plumule, or ascending portion, at the opposite end of the seed on the same side. By an internal law of growth, which we cannot explain, the plumule ascends and the radicle descends. The plumule has been called the ascending axis, and the radicle the descending axis. We shall see, however, that one axis is all that is present, and that from a point in it, growth takes opposite directions. At this point we shall also observe that the axis is attached laterally to the two lobes of the seed—the cotyledons in this case. On the radicle we shall discover, in due time, secondary roots; and at the top of the ascending portion we shall see delicate leaves forming. Those latter correspond with the leaves that first appear above ground when Beans are planted in gardens. We differ from the farmer who *sows* his Beans. The subsequent history of a Bean is well known.

Now what takes place when an acorn germinates is analogous to what has been described. This difference, however, may be noticed namely, that while the food of the embryo Bean plant is stored up in its cotyledons, a slightly different arrangement is made for the nourishing of the young Oak. The latter derives its food from the endosperm of the seed, and in this way its cotyledons are not required to remain under ground to nourish the young plant, and so rise to the surface and become the first pair of leaves on the stem. Cotyledons that rise to the surface are called epigeous, those that remain under hypogeous. These two words are of Greek origin, and mean, respectively, above-ground and under-ground. The cotyledons of most of our trees are epigeous, and their appearance on the surface after germination is an evidence not only that the nutriment in the seed is mostly used up, but also that the plant has reached that stage at which it can derive food from the soil through its roots, and from the air through its leaves.

We have now got our seedling above ground, and to trace its subsequent development we must ascertain the position in relation to other trees in which Nature has placed it. Let us suppose that it has been placed in a solitary position, *i.e.*, the position conducive to our second type of tree. In such a position our seedling will soon rise and spread to considerable dimensions. Its first characteristic form, or outline, will roughly resemble two cones joined at their thick ends, provided the nurseryman or other culturist has not stepped in to interfere with its development by transplantation. The form is remarkable for listless growth in the lower branches. There is a Scotch proverb which says, 'The nearer the kirk the further from grace,' and we seem to have its analogy here in the weakly growth of these lower branches. Those branches will be dealt with by-and-by.

The second form our tree assumes is, roughly, that of a truncated pyramid, or of the letter A with the top lopped off above the cross stroke. The lowest branches have now disappeared, or are so unimportant that they do not seriously mar the outline of the figure described. Otherwise the tree has got bulged in appearance, and the rate of the upward growth has been much retarded, owing to the enormous attraction to side growth, which exposure to horizontal light all round has caused.

The third characteristic form resembles in outline a bell-jar borne on a short stalk; the stalk represents the stem divested of its lowest branches. This form is not far removed in character from the form last described. The difference between them is caused by the top branches having broadened out at a much greater rate than the branches lower on the tree have done. This is a form which never fails to please the eye of the most fastidious observer of forms. If we except the short stem, the tree is simply a monster shrub; and those of us who have the management of shrubs would do well to take notice of it. Our notions as to the forms into which shrubs ought to be trimmed, would thereby receive authoritative correction. That such correction is necessary is evident in the wilful deformities we everywhere meet with. Nature abhors an angular whole, however angular she may make the parts. All her finished works are round. The sky above is round; the sun and moon are round; the old earth is round. A great interpreter of nature has said of ourselves that—

> 'We are such stuff
> As dreams are made of; and our *little* life
> Is *rounded* by a sleep.'

Nature also seeks to retain roundness. Not only does she chafe and hew the angular stone into a round pebble, but, while under her care, the pebble is kept round. The form of tree we are considering, is a form which of all forms she retains longest. It departs only at extreme age. Will all the acumen and taste of the nineteenth century devise how a shrub may be trimmed into another form that will not, to some extent, get obliterated by a single subsequent year's growth?

But the tree has yet another form to assume. It is the form of a mushroom with a long stalk. Gradually from below upwards the branches have disappeared, except a tuft at top of the youngest and most nearly erect ones. If now the tree is not so beautiful, it is more venerable than formerly. Beneath what scanty shade it affords, we begin to reflect how it clapped its leaves when Milton sang, and was still young when George II. died.

> 'O Nature! a' thy shows and forms
> To feeling, pensive hearts hae charms.'

What Burns here calls shows, more prosaic folks call phenomena. What poesy admires, science must account for. Between the poet and the man of science stands, among other figures, the plant culturist. His office is that of mediator. He transforms scientific facts into poetic forms; he corrects Nature according to her own laws of discipline; his ability is invariably an exact measure of his sympathy and of his intimacy with Nature. Having thus defined the culturist and his duties, we pass on to give some account of the forms we have been considering. Before we can do so, however, it will be necessary to enumerate certain laws that are at work.

1. The primary direction of growth, above the collar of a tree, is upwards.
2. Light attracts growth in the direction of the horizon, as well as in the direction of the zenith.
3. Terrestrial gravitation acts in opposition to light on growing parts.
4. Shade and lack of moisture are inimical to growth.
5. Cold and concussion destroy growth.

Proof of the first of these laws has been given in our germination experiment. Proof of the second law may be had from many sources. That light attracts growth horizontally is well known to growers of plants in what are called 'lean-to' greenhouses. Plants grown in such houses require to be frequently turned on their stages to prevent a one-sided or listed development. Our third law, which declares that terrestrial gravitation acts in opposition to light on growing parts, is well exemplified in the Pine family of trees. Trees of this family are remarkable for the horizontal disposition of their branches. If, however, you examine the top shoot of a young Pine when growth is inactive, *i.e.*, during the hibernating season, you will see that the buds at the extremity of the shoot are all disposed in an upward direction. If you will further examine this shoot after the hibernating season has passed, and when the buds have started into growth, you will see that the growths from all the buds—stem and branch buds alike—take an upward posture. Till these tender shoots have attained a length of several inches, gravity does not seem to affect their posture, because they are still all but perpendicular, the only safeguard at all times against gravitative disaster. At this stage a most interesting phenomenon is presented. The delicate young leaves that cover all the shoots begin to spread themselves out in obedience to the promptings of the light that surrounds them. This expansion of the leaves of all the shoots gives rise to a pressure for space at a point above that where all the shoots converge. At this point the pressure is nearly equal all round the central or stem shoot, which is thereby kept in equipoise while all the others are pushed apart far enough to secure the necessary space for all. Gravity now acts effectively upon these branch shoots, and in due time they are compelled to take that posture which is characteristic of all Pine trees, a posture which describes nearly a right angle with the trunk. It is not too much to affirm that to this apparently unimportant fact is due, in great measure, the great timber capabilities of the Pine family of trees. In a word, it redeems them from shrubbiness. 'Very wonderful; can it be so?' Well, it is not to be given credence to because I have said it, or because, probably, I am the first to state it. To assure ourselves of its truth let us go to another Pine tree whose top shoots are at that stage when the pressure referred to begins. Let us take our penknife and carefully remove the central shoot by cutting it at a point immediately above that at which all the shoots are given off. We shall shortly thereafter discover that by removing this shoot we have removed alike the source of pressure and the demand for space, and that the remaining shoots—branchlets though they be—will retain their erect posture in defiance of terrestrial gravitation! Our fourth law declares shade and lack of moisture to be inimical to growth. We have already seen that moisture is necessary. We have also seen that light plays an important part in the economy of growth. That continuous shade, therefore, which is the partial absence of light, is inimical to growth admits not of a doubt. Nature produces nothing that is useless, however; and by-and-by we will see for what beautiful purposes she employs shade.

If we have not already promised to investigate the operation of these laws in producing the forms of tree described, we are, at least, under tacit obligation to do so. It will not be expected, however, that we deal with every form in detail. The time at our disposal does not admit of this, nor does the case require it. All the laws enumerated do not act with equal and unvarying force during all stages of a tree's history. The potency of one law often marks the impotency of another. For example, where light is strong in function, shade is weak in energy; where growth is robust, gravity is proportionately weak in effect. Cold will not injure where heat enough is present, and concussion will not destroy where motion is not violent. It is also useful to remember that the horizontal attraction of light on growing parts of a tree, is not so strong at the surface of the ground—especially if the surface is level—as it is higher up the tree. Whether the attraction of light upon a growing part is as the distance of that part from the ground, I am not prepared to say, but from long observation of the friendly rivalry that exists between light and gravitation in their relations to plant growth, I have been led to entertain a suspicion that something of this kind is the case. However this may be, it is certain that horizontal attraction on growing parts is less potent when these parts are situated low than when situated high on the tree, so that branches given off from a trunk at a point near the surface are—unless they assume an upward posture, and so become what the forester calls 'limbs'—doomed to comparatively early extinction. This accounts for the obconical appearance presented by the lower half of the form of tree first described—an appearance due to listless horizontal growth. To remove the evils of sickly growth in their lower branches, Mr. Rivers invented a new method of training fruit trees. Horticulturists are well acquainted with the advantages attending that method. I have heard gardeners speak of it in terms of highest praise; but one is not sure whether the inventor or the adopters have fully explained to us how such a method of training becomes necessary. The fact that frost may be strongest near the surface does not account for the phenomenon. There the growth is sickly; but the sickness comes not of damage. As weakly horizontal light is prejudicial, so the absence of all horizontal light is fatal to branch development. Seedling trees can be grown so closely together in the seed-bed as to exclude horizontal light from all the plants except those at the edges of the bed; in which case, only those plants at the edges of the bed develop branches. If a plant in the middle of such a bed develop branches, it will give irresistible proof that the condition of horizontal darkness has been relaxed, and that, after all, the law of the 'survival of the fittest' is rather a law of external favour to the fortunate than of victory to the inherently strong.

Let us come to a case that will illustrate not one only but several of the laws enumerated. We have such a case in the third form of tree described, the form akin to that of a bell-jar. We have said this is Nature's favourite form; if the statement be true, the form ought to vouch for it. In our treatment of this form of tree, attention has hitherto been directed almost exclusively to its outline. The remarks we are now about to make have reference to the laws that co-operate in producing such a form, and must not be confined to external configuration. Our inquiries here ought to be conducted when the tree is naked as well as when it is clothed with leaves. To become acquainted with their forms, we must assiduously study trees in winter. Those who love trees for the freshness and colour of their leaves only, may be in the right way to an acquaintance with them, and to a proper appreciation of their beauty; but while their sympathies remain so circumscribed, their progress toward these things will be far from rapid. It is only an unique aristocrat like Herr Teufulsdrökh that can shape overcoats from all nature, and it is only in such as he that we can pardon a love for universal dress. Let our present inquiry be made with a naked tree. At a distance, the form selected is that of a bell-jar resting on its edges. Close examination reveals a short thick trunk in the middle of the dome. Between the trunk and the edges of the dome all round, there is a commodious apartment, a vertical section of which, if taken at the centre, would roughly resemble a pointed pediment. This apartment is formed by a downward sweep of the lowest branches now on the stem. Above where these branches are attached to the stem, other branches, which take a less downward sweep, are given off. Higher up the tree another series is given off at nearly right angles with the stem. Still higher up, the branches begin to assume a more and more upward posture, till the dome is rounded with erect spray. Now, as all these branches had at one time an upward posture, how are those various postures they have now assumed accounted for? They are accounted for in this way, that from the day branches incline towards horizontal light, they are acted upon more or less effectively by gravitation. The force exerted upon them by gravitation is directly as their size, and inversely as the square of their distance from the earth. This force is aided by the superimposed shade *pressing* in the direction in which gravitation is drawing. But does shade actually push or repel growth? Severe experiments are needed to convince us that it does. Into these we cannot at present enter, but this instance may be cited. Two trees are planted side by side; each is shaded on one side by the other. At some distance from these a third tree is planted in similar circumstances every way, except in the circumstance of reciprocal shade. When they arrive at greatness we discover that the branches on the unshaded sides of the two trees grown close to each other are more largely developed than the branches on *any* side of the tree grown in solitude. Again, branches, in proportion to the size and the age of the trees, are larger on the outer sides of trees grown at the margin of a wood, than on *any* side of trees grown in the open park. These instances seem to indicate what we have proof of otherwise, namely, that shade repels growth, just as certain surfaces reflect light. The pendant posture, therefore, of some branches on the tree under consideration is due to the conjoint action of shade and gravitation. We must be careful, however, to distinguish between a tree with odd pendant branches and a 'weeping' tree with all its branches pendant. The two cases are as different as choice and compulsion, and the phenomenon called 'weeping' is in no way bound up with the results of superimposed shade, but seems due in some degree to internal conditions of growth. The same is true of 'fastigiate' forms—the reverse of weeping forms. These laws which operate with so great force upon the lower branches of trees, also act, though with relaxed energy, on the higher branches. Their force is relaxed according to the height of the branches and the lessening of superimposed shade. Hence the posture of branches.

Generally, the oldest branches droop most; the youngest are most nearly vertical; branches of intermediate age assume an intermediate posture. But only generally. Often we discover among the old branches one, grosser than the rest, taking an upward posture. It has not this posture because it is large, but it is large because it has this posture. The presence of such branches would invariably prove contortions to the form of a tree were it not that Nature takes every means to preserve balance. Into the gap caused by such a branch departing from the normal posture branchlets rush to fill it, from above, from below, and from either side of the gap. Heedless of the laws under consideration? No, but in obedience to these laws. The gap is first filled with light. Branchlets below the gap grow upwards to fill it, because growth and perpendicular light are stronger than gravitation and the superimposed shade. Branchlets grow downward to fill it, because gravitation and the superimposed shade are stronger than growth and the perpendicular light. And branchlets grow inward from either side of the gap to fill it, because the horizontal light is superior to all the other external conditions of growth present. Not that any condition is necessarily absent, but because the causative power of one is neutralized by another. Promise was made that Nature's beautiful employment of shade would be referred to; we trust that promise has now been fulfilled. It is not maintained, however, that every irregularity of form is in this way wholly displaced, but we maintain that to this end Nature not only does all she can, but also all that can be done.

In the presence of such a tree one delights to linger. Its 'unhasting yet unresting' laws of form, in their action silent and unobtrusive as the sunbeams that sip the morning dews, are things into which simplicity may look and humility see deep. Longer we cannot linger at this time; but we turn not away without the satisfaction of knowing that however frosts may freeze it and storms concuss it, these laws will, in varying proportion and causative power, wait upon it till its lovely form shall be displaced by one less lovely, till its life ceases to throb response to them, and till the work of centuries has crumbled into dust.

At the outset we spoke of another type of tree—the timber merchant's type of tree. In these days when forestry begins to spread its wings for upward flight, and when it is evident that past indifference threatens future inconvenience, much is being said, and more requires to be said, in regard to this kind of tree. No evil can come from mingling our voice with that of others. In doing so we must not lose sight of the laws enumerated. If to these we add the one which we have been considering, namely, contiguity, or nearness of other trees, means of explaining the development of this kind of tree will be at our disposal. Contiguity, it will be understood, means practically the partial or total exclusion of horizontal light, and has the effect of moderating and of checking side growth. The operation of this law has been exemplified in the case of the overcrowded seed-bed. The use of the word 'checking' is, sometimes, more hackneyed than accurate. To lessen attraction to side growth in a given direction, is something very different from stopping growth in that direction, and the lessening of attraction to horizontal growth is precisely the function of contiguity in the growing of straight, tall stems. It is not denied that contiguity kills side growth; neither is it argued that the death of certain branches at an early stage in the growth of a tree does not impart quality to its timber in a way that is not compatible with the presence of all its branches throughout all its stages. We assert the reverse; we argue the opposite. Contiguity does kill side branches, and the early death of these branches is a guarantee that the timber of that part of the stem will be of superior quality; but the lessening of attraction to side growth means straightness and length of stem. Checking and killing mean good quality of timber. Contiguity has thus a double function. Our estimate of how trees are affected by it is, there is reason to fear, very imperfect, and—if forestry is to advance and hillsides be gladdened and beautified and made more productive to their owners and to the community—must be greatly modified. Such questions as 'At what distance one from another should I plant my trees?' 'At what age should I begin to thin them?' 'When is the best time to prune them, and how should I proceed in the work?' and many others, if asked of twenty different individuals would receive twenty different answers. Why, in regard to almost any question of tree culture, one culturist cannot converse frankly with another culturist for five consecutive minutes till a difference of opinion, expressed or unexpressed, arises between them. To expect that such a state of matters shall cease while the effect of contiguity, or, in other words, the management of light, is either imperfectly understood or wilfully ignored would be to expect too much. That the day is at hand, however, when this all-important matter shall have due recognition is as certain as that to-morrow comes after to-day; and that many of the vexed questions of sylviculture will thereafter cease to exist is also as certain as that yesterday gave place to to-day.

Evidently, we have here a great principle, so great that we cannot touch even the hem of its garment without its character being manifested. But how shall we approach it? Not through British forestry: its methods are too artificial. Nor through French forestry: its peculiar excellence ceases when the floors of its old forests have been carpeted anew with seedlings, and its doctrines are as deaf as others when naked hillsides cry for clothing, and bleak moors for shelter and warmth. Here again we recognise no guide other than Nature. Nature's best forests are all large; her best timber trees are grown close to each other. She kills by shade what has served her purpose, and shelters and preserves what continues to do service. To accomplish that purpose nothing is too valuable to sacrifice, nothing too worthless to cherish. Thousands of seedlings must perish, that ten good trees may grow. Fifty good trees must die prematurely, that other fifty may arrive at maturity and excellence. Seeds are sown to which she denies the conditions of germination, and fruits are dropped to rot unrelished. Prodigal Nature! All this waste for a few timber trees? Yes, partly for that, partly for guidance to all who may grow timber trees, and partly that all who look may learn how timber trees are grown. Not in vain does Nature sow thickly, if we learn thereby to plant closely. It is not wrong in her to kill thousands, while we have to learn how and when to remove what she would kill—to cherish things seemingly worthless till we learn not to despise them. We have no cause to complain of waste that teaches the rudiments of thrift.

From such a forest we learn that the laws of form are the old laws of equilibrium and motion. The forms themselves are the resultants of forces whose magnitude and direction may be computed by means of the well-known parallelogram and polygon of forces. Growth, gravitation, light, shade, cold, concussion, &c., are the forces on whose directions and magnitudes computation is exercised. What goes by the name of *habit* is seen to be not so much a determination of internal laws of growth, as of external conditions. Contiguity is seen to be not merely destructive, but also directive, of side growth, so that trees grown near to each other are invariably taller than trees of the same species grown in solitude. Light and shade are seen to have meanings that cannot be learned from pictures, and functions that are not confined to artistic contrasts: they are seen to be not accidents for which Nature expresses now gladness and now sorrow, but the ready instruments by which her grandest works are reared, and her most benign products placed at the disposal of men.

From such a forest we also learn the cultural value of nurses. One knows not whether he is more amused than baffled in trying to evolve from writings on sylviculture the true theory of nurses.

By some writers we are led to suppose that to shelter other trees from storm is their primary function; but those who suggest this idea also prescribe for the employment of nurses in the most sheltered positions. Others seem to suggest that to preserve warmth, by excluding cold, is the chief use of nurses; but as forests of warm climates require the presence of nurses as much as forests of temperate climates do, the preservation of heat cannot be the function we are in search of. Besides, a close forest, though warmer in winter, is colder in summer than the open plain or hillside. Trees are equalizers of temperature. Every forest is a kind of climatic equation. Other writers seem to suggest that the principal function of nurses is the choking of rank herbage on the floor of a forest, and the killing of certain branches on the trees intended for timber. We admit the power of nurses to do these things, but cannot accept this as their primary function. It has even been suggested that nurses may be used only when the forest is in a locality where small timber commands ready sale. This suggestion squints badly; it has 'one eye on the pot and another up the chimney,' it woos the cook and watches the butler. According to it, the employment of nurses is contingent and arbitrary, and not a cultural necessity. The employment of nurses to produce timber of good quality is not arbitrary. Their primary function is the regulating of horizontal light and the directing of growth. As growth resiles from the shaded side of a tree and seeks the unshaded side, so, when all sides are shaded, growth resiles from all sides and seeks the light of the zenith. The magnitude of the resilience is as the density of the shade. Herein is the secret of timber culture; and herein is the function of nurses.

From such a forest we further learn what place in the culture of forest trees pruning ought to occupy. Cutting off wayward branches becomes unnecessary where the conditions opposed to wayward side-growth are preserved. Superior quality in timber is not a product of whetted steel. In horticulture, where a certain precocity in the fruit tree is necessary to success, pruning may be, and is, practised with unquestionably good results; but in sylviculture, where precocity is displaced by normal vigour of a tree, its practice, except in very special cases, should be dispensed with. We entertain a suspicion that sylviculture borrowed the practice of pruning from horticulture, and are not without hope that the article will in due time be restored to its rightful owner. Many British methods of sylviculture, which exist simply on the ability of Britain to practise them, and of certain trees to endure them, will cease to exist when British sylviculture renounces itself in some measure, and when its friendship with Nature waxes strong.

Time forbids not only our dealing with the forms of trees as affected by cold and concussion—two laws over which the culturist has limited control—but also our reviewing the part played by these laws in the distribution which has been made of trees over the earth's surface. In concluding, we are not unmindful that the ascribing of positive results to laws negative in their character, is very distasteful to certain individuals. They reason in this way: that as darkness, for example, is the absence of light, it must be destitute of results. We have found such persons mighty in the use of the *argumentum reductio ad absurdum*, and have been always careful not to argue with them. But while the lawyer enjoys his *negative pregnant*, and the mathematician his *zero with minus quantities*, we naturalists may surely entertain our *result of negation*. After all, one cannot conceive a *negative condition*. Every condition that exists must be a positive condition of which, as such, results are predicable. We would, therefore, respectfully ask the individuals referred to to expose their persons to the night when Fahrenheit's thermometer stands at twenty or thirty degrees below zero, and to state to us next morning how they and their *argumentum reductio ad absurdum* are reconciled to the results of negative laws. We may therefore be permitted to entertain what at all times we have the strongest right to entertain, namely, the fact that the loveliest forms in nature are the results of a skilful blend of negative and of positive physical laws.

JAMES GORDON.

INVERNESS NURSERIES.

THE first nursery established in the North for the systematic production of forest trees was at Muirtown, and was carried on by two brothers of the name of Fraser. This was about 65 years ago. They were succeeded by the Dicksons (James and George), who took a lease of suitable ground at Millburn, and carried on a large business successfully for a considerable period. About half a century ago, at the time when the demand for forest trees was just beginning to make itself felt in the North, Mr. Charles Lawson, late Lord Provost of Edinburgh, and nurseryman and seedsman to the Highland and Agricultural Society, re-established the nursery business at Muirtown, where it is still carried on. He was succeeded by the Messrs. Howden Brothers. Under them, and subsequently under Messrs. Howden & Company, the business was extended, as increased facilities for the transmission of trees were established. Messrs. Howden & Company now hold about 30 acres of the best land in Sir Alexander Matheson's Inverness property, and this extent is yearly being found more and more insufficient for the requirements of the trade.

This plant-growing establishment is very well known, not only in the North, but also throughout the United Kingdom, and an hour or two may be well spent in it. The grounds are laid off and kept in a style which would do credit to any gentleman's garden.

While large spaces are devoted to the successful cultivation of hardwood and fruit trees, roses, and hardy flowering plants, the bulk of the ground is necessarily occupied by endless thousands of young trees of all ages for forest planting. To give some idea of the numbers of these produced annually, it is computed that of Scotch Fir and Larch alone, one and two years old seedlings, there are not less than 8,000,000 to 10,000,000; this does not include about 3,000,000 more which have been transplanted from one to three years, and are now ready to be sent out. These figures apply only to Scotch Fir and Larch, other coniferous trees which are not planted nearly so extensively may be numbered by the hundred thousand—such as Spruce, Silver Fir, Austrian, Corsican, and Mountain Pines.

The production of such numbers of trees entails a large amount of labour, and employment is thus given to a considerable number of people, and of a class many of which would be otherwise very badly off. At the present time the extracting of the seed from Larch and Scotch Fir cones is being rapidly proceeded with, and is an interesting process. The gathering of these also gives employment to many, at a time of year when usually there is little enough to do. The annual output of forest trees from these nurseries may safely be estimated at close on 5,000,000. The half of this number is to be planted out permanently. Generally speaking, in hill-ground planting about 3,500 plants are put into one acre. This represents, then, a total of about 700 acres planted every year with trees grown by this firm. The bulk of the plants, as may be expected, is dispersed in the northern and western counties, but a goodly number find their way farther south, and even into England and Ireland. The propagation and cultivation of the rarer conifers are also gone into with great success. The lover of trees will find in this department much of interest, especially among the families *Abies*, *Pinus*, and *Picea*. Their varieties are almost endless, and every year adds to the number. We note particularly among the Spruce tribe (*Abies*) the golden and silver varieties of the common one (*Abies excelsa*), also a weeping variety of great beauty, called *Abies inverta*. The varieties *monstrosa* and *Cranstoni* are very peculiar in their style of growth. There are also several neat specimens of the dwarf Spruces, plants whose size belie their years, some of them being over ten years old, and, as yet, have only reached the height of twelve inches. Then there are the White, the Black, and the rare Blue Spruce (*Abies parryana*), with its beautifully-tinted leaves and fine habit of growth; and last, though by no means least, the Douglas Spruce (*Abies Douglasii*), a variety which, by its quick and elegant growth and general adaptability to soils, is rapidly forcing its way into favour, not only for ornamental purposes, but also as a forest tree. Its timber is said to be of very fair quality.

Among the Scotch Fir tribes (*Pinus*) are to be noted large quantities of *cembra* and *strobus*, also *excelsa*, *Jeffreyi*, *ponderosa*, and the lovely grass-green *insignis*. A comparatively recent introduction, called *Bolanderi*, has all the good points of *insignis*, with the addition of greater hardiness than the other possesses.

There are a great many more varieties of this species, but to an unpractised eye they are difficult to distinguish.

The *Piceas* (Silver Fir), like their congeners, the Fir and Spruce, are well sub-divided into varieties. Those most in demand of this family are *Nordmanniana* and *nobilis*, then comes *Lowii*, or *lasiocarpa*, or *Parsonii*, for it is known by all three names. We note also *pinsapo*, with its hard spiny leaves and slow growth, *Webbiana*, the queen of this tribe, *grandis*, *Gordoniana*, and the beautiful *amabilis*.

The Cedars next attract our attention. Several grand specimens of the universally favourite deodar (*Cedrus deodara*) 20 feet high, are to be seen in the grounds, and are models of successful training, as well as hundreds of others in all stages of growth. The Cedar of Lebanon is also grown, though not extensively, as the demand for it is small. Next come the Cryptomerias, with their striking foliage and habit, contrasting well with their neighbours the Cypresses, several varieties of which are largely grown, notably the variety *Lawsoni*, called after Mr. Charles Lawson. *C. Lawsoni erecta* is rapidly displacing the old-fashioned Irish Yew as a cemetery tree. Their style of growth is very similar, but the beautifully-bright, fresh green of their foliage is much more pleasing than the sombre colour of the other, as many fine specimens growing in the Cemetery at Tomnahurich can testify. This notice would be incomplete without mentioning the *Wellingtonia*, well called *gigantea*.

Auraucarias (Monkey Puzzle) are almost wholly represented by several large plants, the remains of what were—prior to the deadly frost of four winters ago—splendid specimens. All the young plants, as well as the older ones, were either killed outright or were so dreadfully mutilated that it was a question whether they were worth keeping or not. Several of those which looked best were kept in the hope that they might improve in appearance, but as yet that hope has not been realised. The ravages of that severe winter carried off hundreds of trees and shrubs of all sizes and ages, species, and varieties. It spared little or nothing, and the soil was left almost to the entire possession of the Scotch Fir and Larch. Its effects are still conspicuous on many of the larger shrubs, and also on the hedges.

From these remarks it will be seen that Inverness possesses an interesting and important branch of industry in the Telford Street Nurseries. The people of Inverness, as well as visitors, could do worse any summer day than devote a spare hour to examine for themselves its wealth of interesting vegetation.—*Northern Chronicle.*

ENGLAND.

THE phenomena of this month are very irregular and uncertain; often very stormy, and fitful in its changes from violent storms to genial calms. The temperature during this month has been known to range from 60° Fahr. to 5° below zero, in the neighbourhood of London. The prevailing winds, in stormy seasons, blow from between the north and north-west, but in milder seasons from south and south-west. The rainfall is very variable in different years, and also in different sections of country contiguous to each other. During last February rain fell at Greenwich on 15 days, to a depth of 2·90 inches; while at Chewton Priory, on the edge of the Mendips, at an altitude of 550 feet above main sea level, rain fell on 20 days to a depth of 5·40 inches.

Orchard.—Finish the planting and pruning of fruit trees, and give a free application of manure to such trees as seem to require it. A compost of fresh rich loam and well-rotted vegetable matter is better than all dung as a manure for fruit trees. Where the stems are infested with moss or insects, they should be scrubbed down with a stiff brush, and afterwards dressed with a wash of hot lime, or some of the many other preparations used for the destruction of moss and insects on trees. Prepare grafting clay for future use, by mixing clay with cow-dung and finely chopped hay, or horse-droppings.

Fences.—Finish planting thorn hedges; also complete the cutting and laying of hedges of all sorts. Agricultural drainage works should also be brought to a close before the end of the month.

Woods.—Forest operations which were recommended last month are suitable for a like state of weather during this, and when the weather is suitable continue to transplant all kinds of forest trees into the forest, and also into the nursery rows. Planting on dry soils should be finished as early as possible; but on retentive soils it may be very successfully conducted during the whole of the month; and where ground game is abundant it is often an advantage to delay planting until this time, to minimise the damage they are likely to cause. Pruning may still be carried on, except upon such trees as bleed early and profusely, but all pruning should be completed by the end of the month. Where the exigency of the forest has to be subservient to the pleasures of sport, this may be the only time when important thinning operations can be carried on; and where this is the case the work should be pushed forward with energy, and the thinnings cleared out into the rides, or elsewhere, as cleverly as possible.

THE NURSERY.—The work of the nursery should now be earnestly and energetically conducted. Get out seedlings into nursery rows, and in open weather, when the ground is sufficiently dry, sow the seeds of Beech, Sycamore, Ash, Elm, Walnut, Mountain Ash, Yew, Cherry, Chestnut, Hazel, Holly, &c., which were not sown in the autumn. Complete putting in cuttings of Willow, Planes, and Poplars, and finish the planting of layers, and re-lay the stocks. Dig between the rows of plants intended to remain, and trench into rough ridges all ground intended for Fir seeds. Strong two year old Oaks, Beeches, &c., that are to remain another year in the nursery rows, should be loosened and lifted from the lines, and have their tap-roots and straggling rootlets carefully pruned with a sharp knife, without shaking much of the earth from them, and be immediately replaced in the same ground to remain for another season. Plants so treated do not generally present a luxuriant appearance during the summer; but they will form bushy and compact roots, which will enhance the chances of their success when transplanted into the forest.

A. PATERSON.

Hunstrete, Pensford, Bristol.

SCOTLAND.

THE winter months have all through been remarkably mild. We have had, up to the time I write, hardly any seasonable weather, and numbers of our earlier plants are advanced out of season.

Embrace every opportunity for the completion of planting on dry ground. The weather all through the season has been so favourable for the work, that little may now remain to be done. The removal of deciduous trees should now be attended to, beginning with the larger sizes; evergreens to be followed up throughout the season as time and weather permit.

Plant up Hawthorn hedges without delay. Upon poor land it seldom makes a satisfactory fence alone; and in such situations it would be advisable to use a large proportion of Beech. Complete the cutting over, or ribbing in of neglected or overgrown hedges, and see to the state of fences generally.

Continue the felling of timber and the thinning of plantations as before recommended. This is a good time to fell hardwoods, the stools of which are wished to be reproductive; complete the same, however, before any movement of the sap. Thin out coppice and dispose of, and deliver timber. Continue preparing a supply of timber as far as possible for estate purposes, firewood, &c., for home consumption.

In the nursery, complete the transplanting of Oak, Beech, &c., pruning off tap and straggling roots carefully, retaining as much earth as possible. This operation will ensure the success of the plants when planted out the following or succeeding year. Cover the roots well, but in all cases avoid deep planting. Forward general nursery work, such as the transplanting of the Alder and larger stuff, digging between lines to remain undisturbed; turn over, fork up, and prepare ground for seed beds, and sow Beech, Ash, Elm, &c., as weather permits. Avoid these operations as much as possible when the ground is charged with too much moisture. Make an early selection of young stock for the nursery. Clean up, dig and dress shrubberies; complete repairs on walks and roads where still unfinished, and prosecute ground-work improvements.

D. Scott.

Darnaway, N.B.

IRELAND.

The month just closed has been one of the mildest Januarys on record; many wild flowers, such as Primroses, Furze, &c., are in full bloom, and Rhododendrons are blowing freely in the gardens. With such a stretch of fine weather forest planting is far advanced, and any still to finish should be pushed forward as fast as possible. Planting in the nursery should now be prosecuted with vigour, endeavouring, if possible, to get through with it before the present favourable weather changes to worse. Dry weather, when free from frost, facilitates planting operations, whether in the nursery or in the forest. Continue the felling of timber, as recommended in this column last month, but all pruning operations should now be suspended until later on in the summer, particularly with such trees as bleed profusely.

Continue splashing overgrown hedges, and in doing so preserve all the young shoots to weave in and out among the older stumps

Indeed, if the exigencies of the place will admit it being done, none but the young spray should be left uncut. Repair all quick-set fences with new plants, and dig along both sides of late-formed fences.

All plantation fences should be thoroughly repaired, as the young trees are frequently sadly injured by the inroads of stock during the spring months, in quest of a fresh bite, which is always to be found in similar enclosures.

D. SYM SCOTT.

Ballinacourte, Tipperary.

WALES.

UP to the present time we have been favoured with extremely mild and open weather, which has been most favourable for planting operations. Under the circumstances planting will, in most cases, have been well advanced: where not already finished, continue as last month during favourable weather. Also continue the planting of hedges in well-prepared ground, and protect from stock and ground game as circumstances require.

The cutting of underwood and the thinning of all hardwood plantations should be finished as early as possible during the present month; continue the thinning of Fir plantations, and remove the thinnings to the drives or sides of the plantations. Bind up faggots, and prepare firewood as last month, carting home, or stacking the same, as time and convenience permit.

Clear out all open drains and ditches in newly thinned plantations. Remove and transplant young stuff in the nursery, filling up all vacant ground that has been well manured and thoroughly cleaned.

LEWIS BAYNE.

Kinmel Park.

HEATH'S FERN PORTFOLIO.—Considerable delay beyond the time anticipated has occurred in the publication of Part I of this work; but Messrs. Sampson Low, Marston & Co. announce that it is now ready. Part I represents a frond of the Royal Fern (*Osmunda regalis*). The plate is 15⅝ by 11⅝ in., and is accompanied by a separate sheet of descriptive letterpress, plate and description being contained in a large paper cover. The figure of *Osmunda regalis* is a facsimile in form, colour, and venation of the original. The publishers announce that from time to time the plates will be bound, and that they will make the most handsome volumes of ferns ever published.

ROOT ABSORPTION.

SIR,—Until lately I believed it to be conclusively proved that all plantations by means of their roots retained a considerable portion of the moisture which fell upon them, thus storing it up—after the manner of a reservoir, if I may use such an expression—for future use. Lately having taken up 'FORESTRY' for May, 1883, and opening at page 54, I read a short article headed 'Scotch Firs,' which leaves an impression on my mind to the effect that all spine or needle-bearing trees absorb *all* moisture, even to a considerable depth below the surface; while leafy trees have exactly the opposite effect. If some of your correspondents will kindly enlighten me on the subject they will much oblige.

AN ENQUIRER.

KAY'S DENDROMETER.

SIR,—In your November issue you have an article on 'Kay's Dendrometer,' with drawings of the same. The instrument described is a very old one, and is commonly known in Germany as Koenig's Messbrett. Whether Koenig invented it, or simply introduced it to the foresters of his day, I am now unable to say; but it is fully described in Koenig's 'Forstmathematik,' and has been brought to the notice of English foresters by Mr. Amery, in his 'Notes on Forestry,' Trübner & Co., 1875!

It seems strange that a silver medal should be awarded by the Scottish Arboricultural Society for an old and well-known instrument of this kind, especially as its use has been almost entirely superseded by Faustmann's Spiegel Hypsometer, which can be used without a stand, and can easily be carried in the pocket.

In case any of your readers should wish to possess the latter instrument, it can easily be obtained from any bookseller in Germany. I bought one last year from Hans Augustin, bookseller, Munden, Hanover, for 7s. 9d.

P. J. CARTER,
Deputy Conservator of Forests.

Tharrawaddy, British Burmah.

SIR,—In the November number of 'FORESTRY' there is an account of Kay's Dendrometer. I think that Faustmann's Hypsometer is a much better instrument for measuring the heights of standing trees, and it is cheaper (if I remember rightly, 10 or 12 marks, or, say, about 14 shillings post free, from Gebrüder Zimmern, successor in Stuttgart). It is better (1) because the readings can be taken at the same time as the observations—a great advantage when the air is not perfectly still; (2) because one person only is required in using it, whereas with Mr. Kay's instrument two are required: one to mark the spot where the horizontal line cuts the tree, and the other to make the observation; (3) it can be used without any staff; (4) it is more compact and transportable, and can easily be carried in one's breast pocket; (5) it is cheaper.

An instrument, in no way different from Mr. Kay's, has long been known in Germany under the name of 'Koenig's Messbrettchen,' but has been quite superseded by superior instruments, such as Fleischmann's, which possesses all its good qualities, and one or two others in addition.

Belgaum, Bombay. J. L. L. MACGREGOR.

PROTECTING TREES FROM GOATS.

SIR,—Mr. N. Ahlbottn made some remarks regarding this, in 'FORESTRY' for December, on which we should like to be better informed.

If the application of coal tar to trees be injurious, what about the remedies? If the tar chokes the pores, how much more must paraffin oil, one of the most searching liquids we have? If coal tar is so very binding and injurious, how do we find so many people recommending it? Mr. McCorquodale, in vol. v., p 266, of your Journal, for one. And do we see trees so readily expand their bark where it has been applied? If Mr. McCorquodale was right in saying that timber, without artificial pressure, will not absorb creosote oil deeper than '1-16th of an inch in close-grained, nor past 1-8th in soft, open, porous timber' (see 'FORESTRY,' vol. vii., p. 209), is it reasonable to suppose that trees will absorb it deeper than the corky or lifeless bark? If coal tar contains creosote oil and is poisonous, is naphtha, paraffin, or seal oils less so, to trees?

Will some of those who 'take an interest' in trees, and who hold Mr. Ahlbottn's views, give us the facts which led them to think as he appears to do? TAR.

LIME TREE WOOD.

SIR,—I shall be glad if any of your readers can inform me whether Lime-tree wood (Linden) is insect proof or not. I have seen it so stated, but can find no authority for it. I intend to use a great deal of it, but wish to know whether it is insect-proof.

180, *King Street West, Hammersmith, W.* E. LONGLEY.

PLANTING TREES.

SIR,—The system advocated by Mr. Scott and others, of paring the surface of grassy land before inserting the plants is, in my opinion, thoroughly wrong. What are the advantages claimed for the system by its advocates and admirers? Your correspondent 'M. B.' claims one advantage. He says: 'When the surface is pared, the roots of the plants have a better chance of being effectively covered.' All that need be said in reference to this advantage claimed by 'M. B.' is, that planting is never done, or at least should never be done, unless under proper supervision, and that the roots of the plants can be inserted in the soil as efficiently without paring as with it. I cannot therefore concede that paring is any advantage in ensuring the work being more thoroughly done; while the evils and disadvantages of paring are obvious. The greater part of the land devoted to tree planting in this country is of a thin, rocky, unculturable character, and in planting such land, if you pare off the surface there is nothing left to hold a plant. And supposing you to have ample depth of soil, I think it is evident that trees planted on an unpared surface can be fixed more firmly, and will consequently withstand storms of wind, and maintain their erect positions better than trees planted on ground denuded of the surface. Anyone connected with planting operations, in going after the break up of a storm over ground recently planted will have observed the notches considerably opened by the action of the frost, and this will occur, however carefully the work may have been done. And this evil in the case of trees planted on the system advocated by

Mr. Scott is greatly intensified: the soil is rendered loose and friable, the trees are blown about and lose any hold they had on the soil. The expense of the system is also a formidable objection to it. A man will plant a third more by the old sytem than the new.

Your other correspondent, 'Tamas' advances a singular, and, I venture to say, an untenable argument in favour of Mr. Scott's system. He says:—'According to his experience, trees planted among grass, unless pared, always died, not so much from being choked as from want of moisture.' Perhaps he will kindly explain when he reverts to the subject, by what process of reasoning he arrived at this conclusion. I always thought that it was a palpable and undeniable fact that grass or other vegetation tends to prevent evaporation and assists in retaining the moisture in the soil. If this be so, 'Tamas' will have to find another reason for the death of his trees planted among grass without paring, than want of moisture.

My strongest objection to the system is, that trees planted in this way are much more liable to be affected and killed by drought than when the surface is left untouched. These observations are directed against the practice of paring grassy or moderately rough ground. Where the ground is covered by rank heather the case is different, and it is absolutely necessary to clear a space before the insertion of the plant.

Proprietors who contemplate planting such land would do well to take the advice of your other correspondent, 'Sylvestris,' and burn it half a dozen years before planting. It could then be planted at half the cost in labour and with greater certainty of success. But I can see no advantage in the method of planting advocated by Mr. Scott, and the objections to it I have endeavoured to point out are sufficient to condemn it. BANNOCKBURN.

FOREST ROADS.

SIR,—I might now well afford to dispense troubling you with any remarks with reference to your correspondent 'Loanleah's' queries anent some recommendations of mine in a recent number of 'FORESTRY,' and to which I had not time to reply last month. I am much obliged to, and would here take the opportunity of thanking those of your correspondents who in your last issue so well defended me, or rather the recommendations which, from experience, I ventured to propound.

In these monthly notes the recommendations ventilated may not apply to every individual case; but are given as being, in the opinion of the writer, generally applicable where forestry is pretty extensively and judiciously practised.

With reference to the laying off of *main* roads in extensive enclosures, I think had 'Loanleah' been under the necessity of opening up and forming these in a young plantation of large extent, he also would acquiesce in my recommendation. I do not mean, however, to recommend that the necessary expenditure to make them sufficient for the heavy traffic they may ultimately require to bear be undertaken when the plantation is formed. I think that would be a most needless and unwise proceeding. It is quite time enough to do so when the roads are required for the purpose of removing the thinnings. What I recommended was: 'that they be marked off and left unplanted; and when the weather was unsuitable for planting such as frosty mornings and evenings, during a short suspension by a snowstorm, that the hands employed might with advantage be occupied in forming these roadways;' *i. e.*, removing abrupt heights, making up hollows, and cutting the track where it crosses declivities: in short, to make it passable. 'Loanleah,' instead of thus employing the hands, would leave a portion of the ground undrained on which to do so, thus draining and planting at almost one and the same time; a practice which, in my opinion, cannot be recommended.

Main roads can, in my opinion, only be planned to advantage when the ground is bare, and the lie of the ground can be properly seen; and those who know their work fairly well do not require to wait for two or three years' growth of the plants to be able to detect the parts on which they will not make progress equal to that of some of the other parts. These portions can generally be indicated before a plant is inserted, and the roads diverted that way if wished. In planning main roads, however, the object for which they are ultimately intended, viz., the removal of the crop, should be kept clearly in view, and in no case, in my opinion, should a deviation from the right course be made unless the difference in expense be very considerable. The offshots or branch roads need not be opened up until required for the removal of the thinnings. They might then be laid off so as to pass through at least some of the parts to which 'Loanleah' refers.

Well laid off and well constructed roads do not only adorn, but also enrich forest lands. The crop in a forest with such roads is of much more value than that in a forest with roads badly or indifferently laid off and constructed. Hence the necessity and importance of laying off all main roads in such a manner as will afford the best facilities for the speedy and cheap transit of the crop; and, I repeat, this can only be done, in extensive enclosures, before planting begins.

Roadways, even in the worst situations, sufficient for the purpose, should be made at considerably less expense than what 'Loanleah' states. I recently completed one of nearly three miles in extent at a cost of about £50 per mile. In this case the roadway was twelve feet wide, which, I think, is quite wide enough. Where stones and gravel were plentiful and within a reasonable distance, the soil was cleared out and a box of ten feet wide of these materials substituted. In passing through heights which had to be cut some depth, this was not necessary. In other soft parts too far distant from the materials referred to, a space of nine or ten feet in the centre of the way was laid with timber; strong prop-wood and tree tops being suitable for this purpose. This is called a 'Corduroy road,' and when well laid in damp situations, is sufficient for many years. A road so constructed, including the value of the timber, will cost from £50 to £80 per mile, and in some cases rather more. It will depend upon the value of such timber in the locality. Even the latter sum, however, and considerably more, should not be grudged to make a good road in a valuable plantation. The difference in value of the first thinnings with a good road, compared with that of a bad or indifferent one, will in many localities pay for the making, and afterwards, with attention, a good road is kept up at small expense. 'Loanleah's' proposal to first plant his roads, and afterwards lift and transplant the trees, is an unnecessary and expensive proceeding, and one which, in my opinion, can be attended with no practical benefit, but rather the opposite. In the end disappointment would be the result.

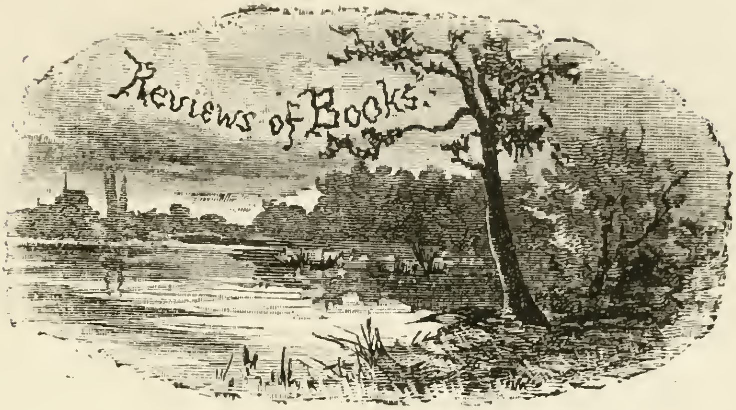
With reference to 'Loanleah's query anent the paring of the turf, where a close grassy vegetation exists, previous to the plants being inserted, I think the practicability—in fact, the necessity—of this to ensure success is so very generally admitted by, at least, practical men, that little need be said in support of it; and I would simply advise 'Loanleah' to test the matter for himself. I think also he might test the correctness of his comparison with reference to the number of plants that can be planted on heathy and grassy ground with turf paring. Instead of being what he states, he will, in my opinion, find the difference very much less, and that, in many cases, the numbers can be equalized, and in some reversed. Be that as it may, I would advise no one to notch plants in such situations without paring. The grasses entwining themselves around the plants press unfavourably upon them, and obstruct a free circulation of the air. They also deprive the plants of much nourishment, and altogether have a prejudicial effect.

The after-cutting of the grass is no equivalent to paring, even although it could be done without injury to the plants, which I cannot admit. Although many of them might, at the time, escape complete destruction, they would, if the grass were sufficiently cleared around their stems, be sure to suffer irreparable injury. And, moreover, grass on hill-sides and other situations, where it might have to be carried a long distance (seeing that 'Loanleah' admits of no roads at this stage), is not so very valuable as to induce any one to cut it without receiving other compensation than the grass itself. If, then, he has to pay for the cutting of his grass for a few years, he will find that paring, previous to notch-planting, or pitting, if the soil is not of a too retentive nature, and the insertion of stronger plants, is infinitely the cheaper and better plan, and that it is so even although he could get his grass cut for nothing.

D. SCOTT.

Darnaway, N.B.

DEACON'S NEWSPAPER PRESS GUIDE.—We have received from Messrs. Samuel Deacon & Co., the well-known advertising agents, of Leadenhall Street, a copy of the new edition of their newspaper press handbook. It is an excellent little volume, tastefully bound in red cloth, and full of interesting and valuable information, including hints to advertisers, full catalogues of London, provincial, and foreign newspapers, carefully arranged and classed. There are also in the volume histories of the rise and progress of the principal newspapers, and, what is a most valuable feature, facsimiles of the first pages of a large number of journals—a great aid to recognition. The book will go nicely into the pocket, and will prove useful, and indeed necessary, to a large number of persons.


Reviews of Books.

The Conquest of England. By JOHN RICHARD GREEN; with portrait and maps. London: Macmillan and Co.

NO modern historian ever achieved the rapid reputation acquired by the late Mr. Green. Departing from the dry-as-dust plan adopted by the majority of history writers, Mr. Green designed a narrative that, whilst avoiding the departure from fact of one school of historians and the repulsiveness of style of the other, should tell its story with absolute precision, with strict regard to actual events, and in a manner that would charm its readers and carry them almost insensibly on from period to period. But more than this, the author of the 'Short History of the English People' determined to write, not the ordinary *répertoire* of court intrigue, regal ambition, and military achievements, but the life of the people. Here, especially, was the merit of Mr. Green's plan, and his eminent success could not have been chronicled more effectively than by the Reviewer who not too eloquently said of this first 'Short History':—'It stands alone as the one general history of the country, for the sake of which all others, if young or old, are wise, will be speedily and surely set aside.'

To the merits of Mr. Green's historical works, published since his first great success was secured, the Press has given abundant testimony, and we need scarcely say that the book before us fully maintains the great reputation which that first book obtained and established for the author. It is greatly to be regretted that Mr. Green did not live to complete the present work; but what remained to be done to prepare it for the press and make it as complete as any hands but that of the originator could make it, Mrs. Green has done. How bravely the author struggled with the fatality that was killing him, in order to finish the story he had begun, is touchingly told in his widow's preface, and the result, painful as were the trials endured to produce it, must retain the author more firmly than ever in the proud position of being in the front rank of modern historians. The period dealt with is that from the reign of Egbert to the completion of the Norman Conquest. To adequately trace the course of the author would be almost to rewrite the history. Suffice it to say that all the author's charm of style and excellence cf treatment are fully reproduced in this volume which no cultivated man can without serious loss afford to exclude from his library.

The English Flower Garden. By W. ROBINSON. Illustrated with many engravings. London: John Murray, Albemarle Street. 1883.

WE welcome this book because it meets a want that has never, in the same form, been supplied. Its object is to give the style, position, and arrangement of the English Flower Garden; and he chapters (excellently illustrated) which deal with alphabetically arranged, of all the plants best suited for the embellishment of a garden, and treats of their culture, and of the positions suited for each. The compiler of the work is well known as the Editor and Proprietor of the *Garden* and numerous other publications, and the work itself is a collection of the contributions to *Garden* and other correspondents whose names and whose cooperation are acknowledged in its pages. In the second and larger part of the work, the dictionary form has been adopted for the arrangement of the information contained in it; and we are glad to notice that the common as well as the scientific names of the plants included and described in this section have been given. The book is therefore its own index, and is most conveniently arranged for reference. Its 300 pages of closely-printed type appear to include a vast amount of information, and the abounding illustrations, admirably printed, will prove to be of immense help to its readers. Under the name of each plant are included, besides the description of the subject, cultural and other notes of great value to garden amateurs. Altogether, the book is a most useful one, and we heartily commend it to our readers.

Granite Crags. By G. F. GORDON CUMMING, Author of 'At Home in Fiji,' 'Fire Fountains,' 'In the Hebrides,' &c. With Illustrations. William Blackwood & Sons, Edinburgh and London. 1884.

THE most voracious appetite for travel and adventure will have a 'sop' of considerable staying power in this bulky and interesting volume. Its contents are as various as they are interesting, and in saying this we speak as much for the attractiveness of the narrative as for the wide range of subjects which it comprehends. From wild gardens, sea birds, sea lions, and 'progressive funerals' in California, we pass to a redwood forest, a chain of volcanoes, a paradise of flowers; discuss the poison Oak, start for the Sierra Nevada, the great San Joaquin and Sacramento valleys, and the far-famed Yosemite. After dwelling on the natural wonders of this fascinating region, our author gives us a general sketch of the mountain ranges of California, enlarging upon their natural features—telling us of the trees, the flowers, the birds, the rattlesnakes, and of a thousand and one matters of interest.

To merely epitomize the topics of interest in this ample volume would far exceed our allotted space; so we must be content to give an extract and then refer our readers to the book itself.

'At last we entered the true forest belt, and anything more beautiful you cannot conceive. . . . . Oh! the loveliness of those Pines and Cedars, living or dead! For the dead trees are draped with the most exquisite golden-green lichen, which hangs in festoons many yards in length, and is unlike any other moss or lichen I ever saw. I can compare it to nothing but gleams of sunshine in the dark forest. Then, too, how beautiful are the long arches of stately columns, red, yellow, or brown, 200 feet in height, and straight as an arrow, losing themselves in their own crown of misty green foliage; and some stand solitary, dead and sun-bleached, telling of careless fires which burnt away their hearts but could not make them fall! . . . . The whole air is scented with the breath of the forest—the aromatic fragrance of resin and of dried cones and Pine needles, baked by the hot sun (how it reminds me of Scotch Firs!), and the atmosphere is clear and crystalline—a medium which softens nothing, and reveals the farthest distance in sharpest detail. Here and there we crossed deep gulches, where streams (swollen to torrents by the melting snow on the upper hills) rushed down over great boulders and prostrated trees—the victims of the winter gales. Then we came to quiet glades in the forest, where the soft lawn-like turf was all jewelled with flowers; and the sunlight trickled through the drooping boughs of the feathery Douglas Pines, and the jolly little chip-monks played hide-and-seek among the great Cedars, and chased one another to the very tops of the tall Pitch Pines which stand like clusters of dark spires, more than 200 feet in height.'

We should like to quote many other passages descriptive of the marvellous and beautiful trees, and of the other natural wonders of the Californian region; but space forbids, and we must reluctantly content ourselves with warmly commending the volume to our readers.

Red Deer. By Richard Jefferies, Author of 'The Gamekeeper at Home,' 'Wild Life in a Southern County,' &c. London: Longmans, Green, and Co. 1884.

We scarcely recognised the clever author of 'Wild Life in a Southern County' in the first few pages of this, the latest volume from his pen. These pages form an introduction to the subject-matter of his new book, and Mr. Jefferies is happiest when he does not attempt any introduction, but begins in the somewhat abrupt way that marks his style. But the impression of a change in manner is only momentary. Our author seems at first to be speaking of a country strange to him, but he becomes rapidly 'at home,' and falls into his peculiar but most happy and clever style of writing. Our interest increases as we turn page after page, and, warming to his subject, Mr. Jefferies draws us willingly along, fascinating by his graphic, terse, and singularly vigorous descriptions.

From 'Red Deer Land'— wild Exmoor — we are led through some delightful chapters on 'Deer in Summer,' 'Antler and Fern,' 'Ways of Deer,' 'Tracking Deer by Slot,' 'The Hunted Stag,' 'Hind Hunting,' 'A Manor House in Deerland,' and 'Game Notes and Folklore.' The chapter headings almost tell their own story, and are just attractive enough to lead all who know the peculiar genius of the author of 'The Gamekeeper at Home' to follow him through the pleasant mazes of 'Red Deer.'

Norfolk Broads and Rivers; or, The Waterways, Lagoons, and Decoys of East Anglia. By G. Christopher Davies, Author of 'The *Swan* and her Crew.' With Illustrations. William Blackwood & Sons, Edinburgh and London.

No lover of the country ever tires of descriptions of the natural features of dear old England, and Mr. Davies has given us some delightful gossip and descriptions in the chapters before us. Collected from various magazines—a source which generally testifies to the interest of miscellaneous papers—the book has been illustrated, and very successfully, from photographs taken by the author himself.

Mr. Davies thinks that there is no better 'playground' in England, and certainly none easier of access or more cheaply to be enjoyed, than the Broad district, and that for persons of a certain bent of mind there is an engrossing charm in the lakes and rivers of East Anglia. He gives in this capitally illustrated volume, first, 'The Broad District,' then the bird life and the fish life of the Broads; the wherries, yachts and yachting, the marshes, the decoys, and notes and incidents about Great Yarmouth; the herring fishery, the swans, the otter; about eels, eel sets, sea breaches, floods, salt tides and tempests, natural phenomena, poaching and pike-fishing. Not only to the angler and general sportsman, but to the general reader, will this volume prove attractive and delightful. The illustrations are especially good, and give a very vivid and realistic impression of the scenes described. We heartily commend the book as another and most interesting contribution to the delightful literature of English topography.

Days and Hours in a Garden. By 'E. V. B.' London: Elliot Stock, Paternoster Row, E.C.

THIS little volume, produced in the antique style, now so much in vogue, is the outcome of that love of what we call 'gardening,' which has produced such an extensive and voluminous literature. The pages which make it up were published first, the author tells us, in a different form, in our contemporary, the *Gardener's Chronicle.* Extended and re-edited, they now form a neat little volume, which from its pleasant garden gossip is sure to delight many of those who are votaries of the pleasant and enjoyable pastime. 'E. V. B.' is, we presume, the distinguished artist whose productions are covered by the same initials, and some of whose sketches illustrate the volume before us in the position of head and tail pieces.

ERRATA.—'Forestal Notes' in January number, at page 191, line 1: for 'an autumn crop of '*rip* grass' (to absorb nitrates), read *rye grass* ; and at page 192, line 6, for '*vitrification* in the soil," read *nitrification.*

THE INTERNATIONAL FORESTRY EXHIBITION.—At a recent meeting of the Committee a communication was read from Her Majesty's forester at Balmoral submitting plans of a Swiss châlet, which Her Majesty proposes to exhibit, along with sections of Scots Firwood from the Ballochbuie Forest. The committee, it need hardly be said, very cordially accepted the offer. The proposed châlet will occupy a considerable extent of space, and, covered with bark, will present a rustic exterior. The sections of Scots Firwood will be shown both in and around the building, and, altogether, the display will form an interesting feature of the Exhibition.

GIRDLED TREES.—Some ten years ago, having seven Apple trees girdled by mice, as soon as the snow was gone I took fresh lard and coated the part eaten well over. I then heaped as much of the soft wet earth over that as I could get to stick. I then took some old rags and tied all securely to the trees, and in the Fall there was hardly a spot but what was covered with a coarse, strong, thick bark. My idea in trying that process was that the sap would rise between the lard and the bare wood and so form new bark. It did so, but whether the idea is correct or not I would not say. For about three months, if the weather is very dry, it is best to water the rag and earth well to keep all moist. I have also saved all my young trees which have had the top all die down, with sometimes part of the stem, by cutting off all down to where the bark is green ; the stump will then force out more buds than are required ; let them grow about 4 in. long, and rub off all but one or two, according to the height of the stump from where the new growth commences. As all my Cherry trees (the common red) is covered with black knot since spring, instead of cutting them all out I intend next spring to use the same method of putting on new heads as with the young trees—with this difference : I will leave on all the large limbs, cutting them about 2 ft. long from the trunk of the tree, cutting them all off at one height from the ground, to form an even tree head.—*Canadian Horticulturist*

Not often Found ?—A man in Oshkosh, Wis., while sawing wood, a local report says, found in a hole in one of the sticks, five ten-dollar gold pieces and two twenty-dollar pieces, besides some small coins.

A Woody Tract.—There is a tract of 'black land' in Piscataquis county, Me., which is heavily timbered with Spruce, Cedar, Pine, and Fir, of which there are estimated to be 100,000,000 ft. The land is owned by two St. Croix, N.B., lumber firms. This winter 7,000,000 will be got out.

A Timber Find.—The St. Croix *Courier* says :—Edward Jack, Esq., has been exploring in the wilds of Northumberland county, N.B., lately, and has discovered a river and numerous lakes which do not appear on any of the published maps, and which are bordered by extensive and valuable forests. From all that we can learn, this is likely to prove a better tract of lumber land than any at present known in the province. Mr. Jack is preparing a full report of his explorations, which, in due time, will be submitted to the surveyor-general, and made more generally public.

Tree Culture in Manitoba.—Considerable interest is being taken in the movement to promote prairie tree culture in Manitoba and the Canadian North-West, and an influential association has been formed in Winnipeg to extend forestry, horticulture, and arboriculture. The association will receive a portion of the annual grant of the Manitoban Board of Agriculture, and with this assistance from the Government active steps will be taken to cultivate the general growth of many fruit and other trees hitherto unknown in the Canadian North-West Territories.

VOL. VII., MAY TO OCTOBER, 1883 OF
FORESTRY was completed with the October Number, and is on sale, bound in handsome light green cloth gilt, beautifully illustrated, price 7/6.

VOLS. III. TO VI. of 'JOURNAL OF FORESTRY' (yearly volumes) are still on sale at 15s. each, bound in green cloth gilt. Vols. I. and II, are out of print.

VERY HANDSOME BINDING CASES for Vol. VII.
are on sale at the Publishing Office, at 1s. 6d., or, 1s. 9d. carriage free.

NOTICE TO CONTRIBUTORS AND CORRESPONDENTS.

It is absolutely essential that all MSS. for insertion should reach the Editor *not later* than the 15TH OF EACH MONTH, *and at an earlier period of the month whenever possible.* Books for review must also be sent before the middle of the month. Letters for the Editor's Box should be as *short* as possible. The place for long contributions is in the body of the magazine. It is a *great assistance*, both to editor and printers, for MSS. to be well and legibly written, and on one side only of the paper.

⁂ Urgent communications for the Editor should be addressed (personally to him) Underwood, Kew Gardens.

THE International Forestry Exhibition at Edinburgh promises to be even more comprehensive and attractive to the general public than the promoters originally anticipated, or at least led the public to believe. Finding that they have practically an unlimited command of room in the spacious grounds which they have fortunately secured for holding the Exhibition, the Executive Committee have wisely postponed the closing of the entries until the last day of the present month, and we hear that they are now prepared to entertain applications for the exhibition of plant and machinery of every description connected with the working of forests, the conversion of timber, and the manufacture and use of wood upon the most extensive scale. Portable railways, timber bridges, engines, trucks, saw-mills, and other machinery and contrivances of every design for the economical transport and conversion of timber, are to be exhibited, with all the latest improvements, by the leading firms ; and as most of these exhibits will be shown in motion they will form a great feature of popular attraction without which the Exhibition would not have been half complete.

⁂

WITH the extension of the time for the closing of the entries to the 31st of this month, many additional exhibitors are certain to take the field, and show to the visitors at the Exhibition the excellence of their manufactures, and the great superiority of the mechanical inventions of the day for the saving of expense and the economising of labour in all the industries in which wood has a part. To the inventors and manufacturers of machinery this will form a valuable opportunity for placing the advantages of their various contrivances and the modes of applying them before those most deeply interested; and we would strongly advise them to apply for the necessary room for their exhibits without delay, because those who are first in the field will undoubtedly be in the best positions, and those who apply late in the day run the risk of paying the usual penalty for their dilatoriness.

⁂

WE would also remind those who intend to exhibit live trees and shrubs—for which we are informed there is now abundance of space of a very eligible kind—that they should not delay in making their entries till the last moment. Those who desire to make a really good display cannot be too soon in securing a site for it in a position where it can be seen to the best advantage; and as we hear that many of the leading tree nurserymen purpose to exhibit, there is certain to be a run upon all the most desirable spots. Collections of rare and ornamental trees, groups of the same, exhibiting beautiful contrast in habit, colour, and foliage, and for other specific purposes, showing their uses in the forest or their beauty in the landscape, will form one of the chief features of interest in the Exhibition, and will afford unlimited scope for taste and skill in their arrangement. Therefore, every detail should be carefully worked out, and the choicest subjects selected for the places in which their beauty may be best displayed, aud their uses most evidently seen.

⁂

FOREIGN countries have already made extensive entries of their forest produce, and the Exhibition will thus have much more of an international character than the generality of such things. From France, Germany, Russia, Italy, and other European countries, numerous and valuable exhibits are promised, and during the present month there will be a very large addition made to the foreign entries, as the original date for closing did not give sufficient time for most of the exhibitors to make complete entries.

⁂

INDIA and the Colonies are also making extensive preparations for being well represented in the Exhibition. Most of them have already applied for a large amount of covered space. The produce of the great forests of Canada and the north-west of America, New Brunswick, and Nova Scotia, will be exhibited by the several provinces in every shape and form, raw and manufactured, in which it can be made useful and attractive to the public. The British Settlements on the west coast of Africa, British Guiana, and the West Indies, will each send varied and interesting collections of tropical forest produce, exhibiting in a marked manner the luxuriant wealth of the vegetable kingdom in those countries the climate of which is so favourable to plant life. From the far-off Australian colonies and the islands of the Pacific numerous valuable contributions will be made to the Exhibition, on the several merits of which it is unnecessary to dwell at present, as they will be all fully treated and described in our reports during the time the Exhibition is open.

⁂

So far as we can learn, it seems that our home forest produce is likely to make a really creditable appearance; although it is said to be a remarkable fact that our foresters are exhibiting an unaccountable amount of diffidence in entering into the spirit of the thing and in bringing their valuable skill and energy to bear in making the Exhibition a success. Why this should be it is difficult to understand. In all ordinary matters of life we have always found foresters as a class to be decidedly ahead of the times and possessed of more than an average share of intelligence, so that to us it seems strange for them to show any hesitation to take a full share in carrying out a scheme so pregnant of good to themselves and to the profession to which they belong.

⁂

In making the foregoing statement, it is not our wish or intention to offend any class. We simply draw attention to a fact which has been prominently brought before us in such a manner that we should be neglecting our duty not to have noticed it. Our friends have it entirely in their own hands to remedy the evil complained of. Every man can, if willing, follow the good example set before him of those industrious and intelligent men who are always ready to lend their aid and practical knowledge to the promotion of any proper scheme for the advancement of their professional brethren or for furthering the best interests of forestry. We therefore look forward with good hope of learning, on the close of the entries, that our foresters have determined to make such a display of British forest produce as will be a credit to themselves and an example for others to follow.

⁂

So far as the patronage and kind assistance of the owners of forest ands, from Her Majesty the Queen to the smallest of landowners, is concerned, there is nothing left to be desired. On all hands the Exhibition has been taken up by them with such an amount of enthusiasm and spirit as has seldom, if ever, been shown towards any similar project of a national character. And we are pleased to learn that they are contributing most fully towards the Loan Collections in the Exhibition. From the Royal Family downwards, all appear to be vying with each other in placing their rare and valuable collections of suitable articles at the disposal of the Exhibition Committee. Included in these will be many extremely rare and curious specimens of woods, showing the unique uses made of them. There will also be contributed numerous valuable trophies of the forest chase, and other objects of natural history of a specially interesting kind, which will form a contrast to those specimens of the vegetable kingdom that must of necessity be the chief characteristic of the Exhibition.

⁂

THE disastrous gales of the past winter will be long remembered by foresters as the most destructive to forests in Britain upon record. So far as we can ascertain, such wide-spread and general disaster has never been seen as is presented in our woods at the present time. In these dull times it is most unfortunate that such a calamity should have happened; but if it result in more careful attention being given to our woods and forests the loss will not have been altogether without its compensation. For some time home timber will be a drug in the market, especially where it is distant from a cheap mode of transit. This may cause inquiry into a more economical method of conveying timber by land than any we have in use at present, and in course of a short time we may expect to see the useful and cheaply-made tram or railroads of other countries introduced into ours.

⁂

BY the use of these cheap tram roads in the forests of Germany and other European countries timber is readily conveyed to great distances at a remarkably small cost. If they could be laid down, as we certainly believe they could, in our forests and on our large estates, they would save an immense amount in the cost of carriage of all heavy goods—including timber, coal, building materials, manure, farm produce, and other articles requiring to be daily moved about on large properties. These tram roads should, if possible, communicate with a river, or the sea, so that timber could at once be rafted and floated to the nearest port, as the heavy charges made by our railways for carrying timber, especially home-grown timber, is the greatest drawback to the profitable realisation of it at the present day.

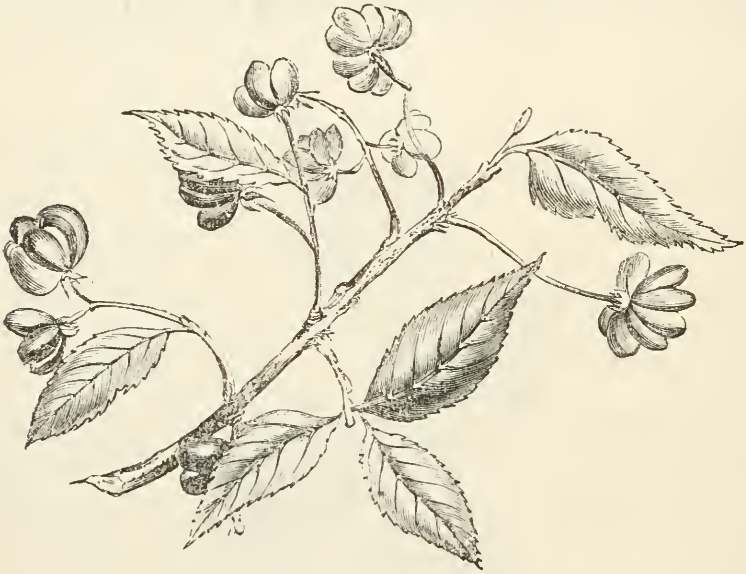
Erratum.—On the first page of February number, for *Foster* read *Fisher*.

BEAUTIES OF BRITISH TREES.

THE SPINDLE-TREE (*Euonymus Europæus*).—Though little more than a shrub, the Spindle-tree claims notice from the beauty of its fruit. It is a species of a small genus in the small order *Celastraceæ*, a genus of plants belonging to the north temperate zone, which derive their flattering name from their bad rather than their good qualities. As the Irish peasant to-day speaks of the fairies euphemistically as 'the good people' because he is afraid of them, so the ancient Greeks called their avenging deities or furies the Eumenides, or 'kind folk,' and their mother, Euonyme, 'her whose name is good.' From its poisonous though lovely fruits the Spindle-tree has been given the name of this once dreaded being. Mainly confined to Europe, our British species is but rarely seen either in Scotland or Ireland; but in the South its smooth bright green shoots and leaves in summer, and its rose-red capsules in autumn, are not uncommon objects in hedgerows

FLOWER OF SPINDLE TREE.

or copses. It may reach a height of twenty feet, but seldom attains any considerable girth, and is more often a mere bush from six to ten feet high. The whole plant is remarkable for its smoothness, for even when the young green wood becomes grey from the development of cork beneath the epidermis, the bark remains even in surface. A point of some physiological interest occurs in connection with this formation of cork. A few woody plants, such as Mistletoe and the Pennsylvanian Maple (*Acer pennsylvanicum*), never form any cork at all, but retain their epidermis and green colour: others, such as the Willows and *Pomaceæ* (Apples, Pears, &c.), form cork from the epidermis itself, and, like most trees, do so towards the end of the first summer in the life of the shoot. In some few plants, such as the Clematis and the Vine, cork originates in the 'bast,' or inner layer of the bark, and as a consequence the bark comes away in long strips; but in *Euonymus*, whilst it arises, as in the majority of trees, just below the epidermis, its formation takes place not on yearling shoots but on those several years old, and until it is formed the branch remains green externally. Anyone cutting a switch of Hazel, Holly, Privet, or, in fact, almost any wood, may notice the bright green layer beneath the dull-coloured external cork.



FRUIT OF SPINDLE TREE.

The four-sided shoots of the Spindle-tree put forth in April delicate smooth pairs of egg-shaped leaves of a rather deep shade of green, on short stalks, each leaf being two or three inches long with a finely-toothed margin and tapering to a point. Among these about a month later appear the sparse clusters of inconspicuous blossoms. They are not half an inch across, and are of a pale green colour, but are remarkable from the regularly tetramerous arrangement of their parts, four overlapping sepals, four petals alternating with them, four stamens, and an ovary made up of four carpels.

The whole plant has an unpleasant odour when bruised, and it is not till the wane of the year that it displays the real charm of 'the fruit, which in our winter woodlands looks a flower.'

The leaves often turn crimson in autumn; but the fleshy, four-lobed fruit is the most distinctive beauty of the tree, resembling as it does a cross of coral, which bursts to disclose one of the most daring of Nature's colour contrasts. This is the deep orange-red 'aril' or fleshy covering to each of the seeds, resembling in structure, colour and function the mace of the nutmeg. Its function is apparently to render the seed more attractive to birds, thus ensuring its dissemination; but undoubtedly, as in the parallel case of the pale blue blossoms amidst the vivid green foliage of Love-in-a-mist (*Nigella sativa*), the deft brush of the Master-Artist has also secured by a bold contrast an effect most pleasing to the human eye.

The wood, being so hard and tough that it can be cut as fine as a needle, is used for a variety of purposes, fine gunpowder charcoal, spindles, skewers, shoe pegs, &c.; but the uncommon character of the fruit gives it a good claim to a place in the shrubbery. Its evergreen Japanese congener (*E. japonicus*), sometimes variegated with white or yellow, and luxuriating in sea breezes, as at our southern watering-places, is a well-known plant, and ably withstands our severest winters and the more deadly London smoke, but does not flower or fruit.

The STRAWBERRY-TREE (*Arbutus unedo*).—Numerous are the points of interest attaching to the tree now perhaps as well known by its classical name of *Arbutus* as by the vernacular 'Strawberry-tree.' A native of the Mediterranean region, and not of northern Europe, it is nevertheless in all probability truly indigenous at Killarney, Mucross and Bantry. It thus forms one of eleven species, classed by Professor Edward Forbes as 'Asturian,' because their nearest habitat to the British Isles is in the region of the Asturias. Of these eleven, six are Saxifrages, one a Rock-cress (*Arabis ciliata*), the remaining four all belonging to the Heath tribe, viz., *Menziesia cærulea*, the Cornish and Mediterranean heaths (*Erica pagans* and *E. Mediterranea*), and the Arbutus. So the Arbutus belongs to that great Heath family to which we also refer the beautiful Azaleas, Rhododendrons and Kalmias, of our gardens, not to speak of the many kinds of Heath and the humbler and less closely related Cranberries and Whortleberries.

The Arbutus reaches more truly the dimensions of a tree than most other members of the order—which are mostly wiry mountain shrubs—being, as it is sometimes, over ten feet in height, and as much as two and a half feet in girth. Like many of the order, its leaves are evergreen, but they are exceptional in their bright green colour—a green with a considerable admixture of yellow, not of blue or of brown—and in their width. They are 'obovate,' or reversedly egg-shaped, with toothed edges, and about three inches long, growing in upright tufts, their stalks being, as are also the young branches, covered with short hairs and glands. Evergreens may be said to be independent of seasons in the matter of flowering; so, whilst the Spurge Laurel' and the Butcher's Broom are among our earliest blossoms, the Arbutus is among the latest, its creamy bells not opening until September or October. Hanging in loose, pendulous clusters, they resemble lilies of the valley, but are not quite so dead a white. Unfortunately, the equinoctial season at which they appear is not favourable to the retention of their pristine beauty unsullied by wind and rain, and the tendency of the corolla to fall early is a characteristic of the genus; but some of them often remain, whilst others have given place to fruit that may even have ripened to its orange-scarlet maturity, so that we have leaf, flower, and fruit together, as is so often the case in the plant from which the tree takes its English name.

Perhaps no order shows the variety and beauty of form in the corolla as we have it in the pure colours of the Heath tribe. One is simply horrified at the want of refinement in our botanical terminology that can find no better names than 'tubular,' 'campanulate' or 'urceolate,' tub-shaped! Words cannot express the exquisite proportions of the chalice-like flower of the Kalmia; and the shape of that of the Arbutus is almost equally unique in its beauty; whilst, when the observant eye discovers the secret of the contrivances within the cup, the intellect is as charmed as are the senses by its exterior. Within this tiny bell, not half an inch across, ten tiny stamens surround the central column of the pistil. This is indeed a column, a honey-secreting 'disk' acting as plinth, the ovary completing the base, while the broadened viscid stigma crowns the style as capital to the pillar. The ten stamens spring from the base of the corolla-tube, each consisting of short but stout filaments coated with hairs and tapering towards the anther, the other and more unusually shaped portion of the stamen. This consists of two parallel and united ovoid bags, tapering at each end to a blunt point, each having near one extremity a tail-like process projecting from it almost at a right angle, whilst at the other end of the anther, when immature, is a single viscid, pointed appendage. At first the filaments bend outwards towards the corolla; the tails of the anthers hang towards its base whilst the viscid point is firmly cemented low down on the style. A change in the direction of growth of the filaments then takes place, technically known as 'hyponasty'—a change similar to that which causes the petals of the Crocus to close towards evening—and they bend inwards towards the style as they lengthen, causing the anthers to revolve through about 120 degrees, on the point cemented to the style, until their tails point towards the mouth of the corolla-tube and their blunt ends are pressed against the style. Then, while the viscid point has separated from the style and disappeared, a thin membrane closing the end of the anther also disappears, so that the pollen is only kept in as long as the point of the anther is against the style. The flowers are pendulous and are much visited by bees, who, hovering beneath them, thrust their proboscis into the bell to gather the honey that clings to the hairs on the filaments. In doing this they must touch some of the twenty tail-like processes which radiate from the style, like spokes to a wheel, and, if they do so, will tear the open mouth of the anther from its contact with that central column, when the pollen will fall down upon the hairy head and back of the intruder, to be carried to the stigma of the next blossom against which it may run its head. This is perhaps the most elaborate process in the order for securing cross-fertilisation, though analogous but simpler methods obtain in the Whortleberries, and the whole group is characterised by the anthers bursting by 'pores' at the top instead of splitting as usual lengthwise.

The round berries that succeed these interesting blossoms have a surface projecting in numerous points, more like the fruit known as Litchi than the Strawberry, which it approaches in colour. The ovary being above the calyx it is not technically a berry, but a 'nuculane' or 'uva,' and is divided internally into five chambers, each containing four or five seeds.

Unfortunately in the colder climate of the northern and eastern parts of our islands the fruit, if formed, is but seldom ripened, and in fact the whole plant is very liable to be cut down by frost; but where it is indigenous, or naturalised—as at Clifton, where it has grown from self-sown seed for many years—or perfectly at home, the gradual change from green to a rich scarlet with a considerable admixture of orange-yellow renders the tree one of the brightest in general colouring that we have.

Thrushes and blackbirds are extremely fond of these attractive fruits; but to our taste they are so insipid as to have earned for the plant the undeservedly opprobrious specific name *unedo*, 'one I eat,' suggesting that no one would care to eat a second. Nevertheless, though it is perhaps for its evergreen shade—that *Arbutus umbra*, celebrated by Virgil, is most valued in the sunny south, its fruit is fermented into a wine in Corsica and in some parts of Italy. The leaves and bark are said to be rich in gallic acid and to be used in consequence in the Levant for tanning.

It is, however, purely on account of its beauty that the tree is to be recommended in England. It seems to like a well-drained and warm soil, sand, or, perhaps preferably, limestone, and a situation not exposed to frost. I well remember a large specimen, in a garden on the Greensand in Surrey, among whose oft-forked branches I have climbed with several other children. Its stem must have been of considerable girth, and the tree twelve or fifteen feet high, and I have seen it like a wood full of lilies of the valley, and again loaded with ripe berries—a tree, alas, never to be seen again. It darkened our dining-room windows, and was supposed to make that side of the house damp; and it fell.

G. S. BOULGER.

DR. LYONS, M.P., AND FORESTRY ABROAD.

WE have much pleasure in publishing the subjoined letter and correspondence sent to us by Dr. Lyons, M.P., whose article on the reafforesting of Ireland in 'FORESTRY' for February, 1883, first called prominent attention to the important subject which the able Member for Dublin has taken in hand so energetically:—

Merrion Square West, Dublin,
January 27, 1884.

DEAR SIR,—I beg to send you copy of Reports of Foreign Offices on the Forestry of European Countries. The Report on Russia is partly printed, and I shall send it to you when completed; others will follow in due course. I have also inquiries afloat in Canada and the United States. The national commercial importance of this inquiry cannot be overrated. It is time for this empire to be alive to the situation which concerns her so profoundly.

Faithfully yours, R. S. D. LYONS.

F. G. HEATH, Esq.

FORESTS IN PRUSSIA (PRELIMINARY.)

Mr. JOHN WALSHAM to EARL GRANVILLE.

Berlin, Sept. 10, 1883.

MY LORD,—In compliance with the instructions conveyed to me in your Lordship's commercial despatch, No. 48 of the 7th inst., I have the honour to transmit herewith (1) a copy of the law of April 15, 1878, for the protection of woods and forests from theft; (2) a copy of the laws respecting the administration and management of the woodlands belonging to the Communes and public institutions, as well as of woods planted for the purpose of sheltering exposed places; and (3) a copy of the law of April 1, 1880, containing the regulations for the rural and forest police.

I beg also to enclose a copy of the regulations for the education and examination of those who are candidates for the State Forestry Administrations, as issued by the Minister of Agricultural Domains and Forests on the 1st ultimo, and published] in the official *Reiches und Staat's Auzèige* of the 31st ult.—I have the honour, &c.,

(Signed) JOHN WALSHAM.

P.S.—The Laws which I have enclosed in this despatch are the Forest Regulations for the Kingdom of Prussia, there being no single code for the whole of the Empire. J. W.

FORESTS IN SWEDEN AND NORWAY (PRELIMINARY.)

Lord EDMUND FITZMAURICE, M.P., to Dr. LYONS, M.P.

Foreign Office, Oct. 31, 1883.

SIR,—With reference to your letter of 21st ultimo, I am directed by Earl Granville to transmit to you herewith a collection of the Forest Laws in force in Sweden and Norway, which have been received from the Swedish Ministers of Foreign Affairs.

The following refer to Sweden:

(1.) A collection of the Forest Laws and Regulations published before 1877.

(2 to 6.) Copies of five different royal ordinances published since that period.

(7.) A copy of the first Report of the Administration of Woods and Forests, containing a history of Agriculture in Sweden prior to 1870; and

(8.) A copy of the last Report of the same Administration (for 1881).

The remaining four enclosures have reference to Norway.

(9.) A copy of the Code of Forest Law of the 22nd June, 1863.

(10.) A copy of the Law of the 12th October, 1857, regulating the working of Communal Forests.

(11.) A copy of the first project of Law elaborated by the Royal Commission charged with the revision of the Forest Laws.

(12). A copy of the final project of Law drawn up by this same commission.—I am, Sir, your most obedient, humble servant,

Dr. LYONS, M.P., EDMUND FITZMAURICE.
8, Merrion Square, Dublin.

AUDLEY GOSLING, Esq., to the Right Hon. the Earl GRANVILLE, K.G.

Copenhagen, Oct. 31, 1883.

MY LORD,—On receipt of your Excellency's despatch, marked No. 19 of this series, of the 7th ult., Mr. Vivian requested the Danish Minister for Foreign Affairs to present him with a copy of the Danish Code of Forest Laws.

I have now the honour to inform your Lordship that no such code exists in Denmark, but that matters concerning the forests are regulated by special laws, of which the ordinance of Sept. 27, 1805, contains the most important legal enactments in force relative to their control.

This ordinance took away from the peasants the right they had hitherto enjoyed of pasturing their horses and horned cattle in the forest. This was a most necessary enactment, as 'the herds of cattle destroyed what the proprietor's axe had spared.'

The law of 1805, moreover, forbids the destruction of any existing forest in the future. It has been most energetically enforced, and it is to it that the preservation of the forests in Denmark is mainly due.

I have the honour to enclose for your Lordship's more complete information copies of the circular of 27th May, 1854, relative to the control of private forests; of the law of the 22nd January, 1869, which is an appendix to the law of 8th March, 1856, concerning the establishment of a Veterinary and Agricultural School at Copenhagen; of publications of 30th Aug., 1872, and 18th March, 1874, relative to the examination of students in forestry; of documents issued by the Statistical Department, concerning the forests under its control; of a *Notice of Forests in Denmark*, by M. Müller; and a work by the same author, intituled, *A Sketch of Danish Forest Statistics.*—I have, &c. (Signed) AUDLEY GOSLING.

The Right Hon. Earl GRANVILLE, K.G.

FORESTRY IN DENMARK (PRELIMINARY).

Lord EDMUND FITZMAURICE, M.P., to Dr. LYONS, M.P.

Foreign Office, Dec. 15, 1883.

SIR,—With reference to previous correspondence, I am directed by Earl Granville to transmit to you herewith a copy of a despatch from Her Majesty's Chargé d'Affaires at Copenhagen, enclosing the answer which he has received from the Danish Government to his application for information respecting the revenue and expenditure in connection with the forests of Denmark.—I am, Sir, your most obedient, humble servant, EDMUND FITZMAURICE.

Dr. LYONS, M.P.,
Merrion Square, Dublin.

(Enclosure.)

AUDLEY GOSLING, Esq., to Lord E. FITZMAURICE, M.P., &c.

Copenhagen, Dec. 10, 1883.

MY LORD,—Referring to your Lordship's note of the 6th ult., and to my acknowledgment of the receipt thereof on the 10th ult., I have the honour to enclose copy of a communication which has been addressed to me by the Danish Minister of Foreign Affairs, stating that, as regards the revenue and expenditure in connection with the forests of Denmark, there are no complete statistics which would enable his Excellency to reply accurately to this question.

He, however, draws my attention to a work published by Professor Falbe Hausen and Scharling ('Haandbogi Danne-mark, Statistik') in which there is a statement concerning the revenue of the Crown forests up to the year 1879–80, but as these only represent from one-fifth to one-fourth part of the Danish forests, this information does not furnish the details required by your Lordship.

As regards the rise or fall of the timber supply, his Excellency is likewise unable to furnish me with accurate information, but in the opinion of the Minister of Finance, there is every reason for presuming that the supply of both timber and logs is rather increasing than the contrary, attributable to the care and economy prescribed by the Forest Laws, and to planting of Moor Lands during a number of years. His Excellency adds that whilst the exports of timber and logs have been much restricted of late years, the import of these articles has risen to fourteen millions of cubic feet per annum.—I have, &c.,

(Signed) AUDLEY GOSLING.

Lord E. FITZMAURICE, M.P.

REPORTS.

Lord EDMUND FITZMAURICE, M.P., to Dr. LYONS, M.P.

Foreign Office, Dec. 20, 1883.

SIR,—With reference to your letter of the 1st ult., I am directed by Earl Granville to forward herewith for your information, and to be returned when read, Reports which have been drawn up at Her Majesty's Embassies at Berlin and St. Petersburg, on the subject of forests in Germany and Russia.—I am, Sir, your most obedient, humble servant, EDMUND FITZMAURICE.

REPORT ON THE GENERAL ADMINISTRATION OF PRUSSIAN STATE FORESTS.

The Woods and Forests Administration in Prussia is under the supervision of the Minister of Agriculture, and has a Budget which is annually laid before the Landtag.

A further Report is issued at various intervals, giving special information as to the acreage of forests, &c., and also any reasons which existed for the rise or fall in revenue, expenses of administration, &c. The last such Report comprised the years 1876–1880, and beyond that date no published information concerning these facts exists, by which any statistical information can be obtained as to the administration of, and amount of timber supplied by forests, in the hands of private individuals, which are, however, of very considerable extent.

It is equally difficult to obtain any statistical information as to the forests' administration of the whole Empire, as each State has its own department of agriculture.

General Results (1876–1883) will be found at the end of the Report in Appendix A. It will be seen that from 1876–1880 the surplus shows a continued decrease. It was hoped that the amelioration which was observable that year would continue; but owing to continually increasing expenditure this hope has not been fulfilled, and whereas in 1880 the falling off since 1876 amounted to £310,000 sterling, that of 1883 shows a further decrease of £230,000 sterling, making in all a revenue falling short by some £540,000 of what it was eight years ago.

The area of land in the hands of the Administration amounted in 1880 to nearly seven million acres, of which about one-twentieth consisted of plough and meadow land, &c., and about the same amount of waste land, leaving altogether a surface of over six million acres on which timber is grown.

The natural produce in comparison to the superficial area will be found in Appendix B.

The superficial area, it will be seen, remains at about the same amount, whereas the natural produce has sensibly increased, owing to better management, since 1877, in which year the produce was at its lowest, owing to the stormy weather of the previous year, which considerably damaged the woods destined for future use.

The revenue from the sale of wood will be found included in the General Budget, Appendix C. Between 1876 and 1879 there was a falling off of some £500,000 sterling. The rise in the price of wood in the year 1880 caused an increase compared with the previous year of £200,000 sterling, and the last returns show that since that time there has only been a falling off of about £40,000 sterling, due in part to the increase in foreign competition.

The variations in the revenue from other sources than the sale of actual timber (Appendix C) are due principally to agricultural prosperity or depression, and to the rise or fall in the price of hay, especially in the Eastern Provinces of Prussia.

Expenditure.—The costs of administration, including employés wages and pensions, and employés' dwellings, &c., as well as the general expenses connected with the maintenance of the forests, &c., will be found in Appendix D, and the following table shows the average expenses per acre, all payments and outgoings included.

Years.	Cost of Administration.	Cost of keeping up Forests.	Total.
	s. d.	s. d.	s. d.
1876	1 11	2 8	4 7
1883	1 9	2 6	4 3

Net returns amount, with certain fluctuations (*vide* Appendix A), to about 45 per cent. of the gross returns, showing, as do the other figures, a sensible falling off since the year 1876, when they amounted to about 52 per cent. The percentage appears, however, to have been latterly fairly maintained, and if it never reaches the standard attained in 1876, it is owing, amongst other causes, to several fresh indirect expenses connected with the new Provinces, which have been borne by the Administration. They (the net returns) amount on an average to about four shillings per acre.

Organization.

In 1880 the Official Report showed that the number of employés in the pay of the Administration amounted to 4,617, of whom—

122 were Head Foresters,
680 „ Foresters,
3,714 „ Keepers, Watchers, &c.,

making an average of

1 Head Forester	to every	54,500 acres
1 Forester	„	9,500 „
1 Keeper, &c.	„	1,795 „

Special attention is drawn to the *expenses in connection with the making of roads in the woods*, as well as other outlays in which money has been sunk, and it is asserted that all the money which has been spent in this way has paid itself over and over again, as the ultimate worth of forest produce depends largely on the facilities which exist for transporting that produce.

Introduction of Foreign Trees.

The desirability of attempting to introduce other than indigenous trees into Prussia has also claimed the attention of the authorities, who point out that, in the event of the experiment being attended with success, not only would less wood have to be imported, but that the revenue from their department would be considerably increased.

Of course, they add, care should be taken in growing foreign trees to select those which are found in as many latitudes as possible, and their growth should not, at any rate yet, be attempted in those parts of the empire which are subject to the severest winters.

In the Budget for 1880, 50,000 marks were set aside for the purpose; but as no later report has been issued, means are wanting by which to ascertain whether the experiment is being attended by the hoped-for success.

The following list comprises those foreign trees which were to be introduced:—

Pinus rigida	from	N.	America	(East).
Abies Douglasii	,,	N.	America	(West).
,, nordmanniana	,,	Caucasus.		
Thuja gigantea	,,	N.	America	(East).
Carya alba	,,	,,	,,	,,
Juglans nigra	,,	,,	,,	,,
Pinus ponderosa	,,	,,	,,	(West).
,, Jeffreyi	,,	,,	,,	,,
,, laricio	,,	Southern Europe.		
Picea sitchensis	,,	Japan.		
Cupressus Lawsonia	,,	N.	America	(West).
Juniperus virginiana	,,	,,	,,	—
Acer negundo	,,	,,	,,	(West).
,, sacharinum	,,	,,	,,	—
,, dasycarpum	,,	,,	,,	—
Betula Lenta	,,	,,	,,	—
Carya amara	,,	,,	,,	(East).
,, aquatica	,,	,,	,,	,,
,, tomentosa	,,	,,	,,	,,
,, porcina	,,	,,	,,	,,
Quercus rubra	,,	,,	,,	,,
Populus monolifera	,,	,,	,,	,,

and also some Japanese coniferous trees.

EMPLOYÉS' FIRE INSURANCE ASSOCIATION.

This association appears to have been in a failing condition from want of funds, when, by an Imperial order of December, 1880, a sum of fifteen thousand marks (£750) was placed to its credit out of the State Treasury, and it was hoped that this sum would start it afresh.

In March, 1881, the number of subscribers was 2,105, with a total fund of £614,485.

EDUCATION IN FORESTRY.

The School of Forestry at Eberswald, completed, in June, 1880, the 50th year of its existence, and at that period had in all nearly 1,600 pupils.

There is also a School of Forestry at Münden, and the half-yearly attendance at both schools showed in 1878 an average of 148 pupils, whereas in 1880 the number had increased to 210.

The attendance was therefore largly on the increase, and it was then proposed to give voluntary education in these matters to the 'Jäger Bataillonen' of the army. This plan has, according to latest accounts, been attended with much success, so much so that the education is obligatory and forms a regular portion of their service.

In general the substance of the report, and of the later budgets, shows that the administration of woods and forests in Prussia is in a satisfactory condition, and that whereas in former years an insufficient control and bad management were responsible for fluctuations in the revenue, those causes have now ceased to exist, and that any diminution in the returns is due to the inevitable consequence of unusually bad winters, the continual increase of foreign competition, and to the large extent to which coal and coke are now being used for heating purposes.

From 1876–1880 a detailed statement will be found in the appendices of the General Budget, including all the sources of revenue, the items of expenditure, and the average production, &c., reduced, as accurately as is possible, to English figures.

From 1881 up to date, it is almost impossible to compile a statement giving all the above details, but the general revenue and expenditure is annexed, and the details correspond almost exactly (except as regards slight fluctuations) with those of previous years.

The various appendices are annexed on the following page and onwards.

British Embassy, Berlin,
December 14, 1883.

HENRY CADOGAN.

[*Appendix A.*]

GENERAL RESULTS.—1876–1883.

(Reduced to Pounds.)

Year.	Income.		Expenditure.		Surplus.	
	£	s.	£	s.	£	s.
1876	2,957,951	14	1,474,140	1	1,483,811	13
1877	2,573,541	14	1,493,163	8	1,080,778	6
1878	2,443,223	1	1,450,246	11	942,976	10
1879	2,372,942	11	1,382,026	14	940,915	17
1880	2,581,918	7	1,408,890	17	1,173,027	10
1881	2,525,000	0	1,519,315	0	1,005,685	0
1882	2,579,350	0	1,603,750	0	975,600	0
1883	2,618,575	0	1,625,725	0	992,850	0

[*Appendix B.*]

TABLE SHOWING AREA OF LAND UNDER FORESTS' ADMINISTRATION AS COMPARED WITH NATURAL PRODUCE THEREOF.

(Reduced to Acres and Cubic Yards.)

Year.	SUPERFICIAL AREA.				NATURAL PRODUCE.				Percentage of rough timber used as building wood.
	Ground utilised for growing wood.	Ground utilised for other purposes.	Waste and Marsh Land.	TOTAL.	Rough Timber.	Fire and Brushwood.	TOTAL.	Average per year and acre.	
	ACRES (AND DECIMALS).				CUBIC YARDS.				
1876	5,878,020	401,635	278,230	6,557,885	7,875,565	3,206,788	11,081,353	1·89	24
1877	5,885,770	407,360	278,230	6,571,385	7,279,300	3,055,988	10,335,288	1·72	27
1878	5,971,107·5	405,860	277,542·5	6,554,510	6,992,681	2,771,658	9,764,339	1·63	28
1879	5,997,267·5	386,232·5	292,595	6,676,095	6,874,777	2,875,394	9,750,171	1·62	28
1880	5,984,700	386,232·5	292,595	6,663,527·5	7,393,293	3,026,540	10,419,833	1·76	28

2·5 Acres are calculated to the Hektar.

9 Cubio Yards are calculated at 7 Cubic Metres.

[*Appendix C.*]

TABLE SHOWING GENERAL REVENUE DERIVED BY THE PRUSSIAN FORESTS' ADMINISTRATION.

Reduced from Hektars and Marks to Acres and Pounds (approximately).

GENERAL INCOME.												
FROM WOOD.											TOTAL.	
Year.	Amount of money paid in.	Worth of wood given away free.	Total.	Average per acre of *forest* land.	Average price of timber per cubic yd. (Fire & Brushwood calculated at 0·5 of timber.)	From various sources. Grass, Fodder, Pasture Land, Plough Land.	Sale of Game.	From the Schools of Forestry.	From sundry other sources of revenue.	From Peat, River Produce, Saw Mills, Nurseries for Trees, and the Deer Forest at Cleve.	Actual amount of money paid in. (Exclusive of wood given away free. Col. 2)	Average per acre of *all* land; in use.
	£ s.	£ s.	£ s.	s. d.	s. d.	£ s.	£ s.	£ s.	£ s.	£ s.	£ d.	s. d.
1876	2,632,743 17	119,433 13	2,752,177 10	9 4	5 8	225,581 16	16,831 5	893 1	18,210 18	63,690 17	2,957,951 11	9 6
1877	2,256,956 13	110,413 12	2,367,370 5	8 1	5 3	222,045 15	16,823 10	982 6	17,042 18	60,090 10	2,573,941 14	8 2
1878	2,147,102 6	114,850 7	2,261,952 13	7 5	5 3	194,093 10	17,165 7	1,189 4	27,639 19	56,082 15	2,443,223 1	7 9
1879	2,093,287 2	102,394 18	2,195,682 7	7 4	5 2	188,421 19	17,032 1	1,344 7	20,249 0	52,607 14	2 372,942 11	7 5
1880	2,289,394 4	108,075 7	2,397,469 11	8 0	5 4	201,309 12	17,171 6	1,589 10	18,363 3	53,599 12	2,581,918 7	8 1

[*Appendix D.*]

TABLE SHOWING GENERAL EXPENDITURE OF THE RUSSIAN FORESTS' ADMINISTRATION.

Reduced from Marks and Hektars to Pounds and Acres.

GENERAL EXPENDITURE.—I. Costs connected with the Administration.

Year.	*A.*—Wages, etc., of Employés.																*B*		*C*		*D*		*E*			
	For Superintendents, Head Foresters, and Assistants in the State Pay.			Foresters and Officials employed in other ways.			For Employés of a Lower Grade.																			
							Those Employés' wages who appear in the Budget.																			
	Number of Superintendents and Head Foresters.	Wages, including Lodging allowance.		Number.	Wages.		Number of Gamekeepers (Foresters).	Number of Under do.	Wages		Extra Assistants and Expenses connected with Extra Forest Police.		Total of Wages of Employés of a Lower Grade.		General Total of *A*—all Employés' Wages.		Wages of Accountants, etc., inclusive of Lodging allowance.		Extra Remunerations and Presents to Employés.		For Widows and Orphans of Employés, and for Pensions to Retired Employés.		Expenses connected with Servants' Dwellings and Lodging Rent.		TOTAL I. of Costs connected with the Administration.	
		£	s.		£	s.			£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.
1876	124	52,358	2	684	140,290	19	3354	381	185,877	10	57,075	0	242,952	19	435,602	1	48,206	14	8,394	13	10,812	17	118,778	9	621,794	14
1877	122	52,373	6	686	141,323	13	3367	386	187,651	9	52,361	16	245,013	5	438,710	4	43,150	18	8,386	5	10,440	18	128,032	7	628,720	12
1878	122	52,317	15	685	141,465	16	3376	389	188,078	11	57,811	16	245,890	7	439,673	18	34,961	7	8,413	0	10,501	2	108,724	13	602,274	0
1879	122	52,162	12	688	142,523	9	3386	388	188,084	8	58,905	12	246,990	0	441,681	1	34,715	10	8,371	19	10,456	19	95,819	15	591,045	4
1880	122	52,037	7	690	142,329	16	3397	387	188,821	19	59,697	7	248,519	6	442 886	9	37,282	8	8,397	2	10,390	17	102,094	3	601,050	19

GENERAL EXPENDITURE.—II. Costs connected with the Maintenance of the Forests, etc.

Year.	Wages of Persons employed in Cutting Down and Up-rooting Trees, and in Stacking Wood.		Construction and Maintenance of Public Roads in Forests.		Water Conduits in Forests.		Planting New Trees and Making Paths for carrying away felled Timber.		Expenses connected with Plans, Measurements, etc.		Expenses connected with the Preservation of Game.		Expenses of Peat, River Produce, Saw Mills, Tree Nurseries, Deer Forest at Cleve.		Expenses connected with Boundary Lines and Law Suits.		Various Sundry Expenses—Printing, Tournies, etc.		Schools of Forestry and Similar Objects.		Taxes.		Payments of Former Expenses Incurred.		TOTAL II. Expenses connected with the Maintenance of Forests.		General Total of Expenditure.	
	£	s.	£	s.	£	s	£	s	£	s.	£	s.	£	s	£	s.	£	s.	£	s.	£	s.	£	s	£	s.	£	s.
1876	417,213	0	58,048	1	1,602	1	187,035	16	17,722	11	4,032	9	44,298	9	8,981	6	53,913	9	7,765	5	24,517	19	25,029	14	852,345	7	1,474,140	1
1877	394,325	9	66,729	11	1,450	16	191,423	17	19,883	16	3,884	14	43,112	16	8,188	6	63,937	4	7,764	10	26,261	8	33,873	2	864,442	16	1,493,163	8
1878	372,534	19	61,490	4	2,406	8	188,209	6	19,501	6	3,577	7	42,635	0	8,774	1	67,698	0	8,613	19	29,528	17	39,439	6	847,972	11	1,450,246	11
1879	354,290	10	66,412	4	3,567	13	180,739	8	17,630	9	3,490	1	35,948	11	8,705	12	37,869	3	8,013	17	28,895	9	41,737	2	790,981	10	1,382,026	14
1880	379,902	0	65,413	16	1,945	16	180,220	0	17,326	7	3,088	0	38,002	12	8,278	13	34,499	13	8,309	17	29,423	12	40,929	10	807,839	18	1,408,890	17

NET SURPLUS.		
(*a.*) ALTOGETHER.		Percentage of Net surplus Compared with General Returns.
(*b.*) After Deducting Wood Given Away Free.	Per Acre of all Ground in use.	
£ s.	s.	
(*a.*) 1,603,245 6	(*a.*) 5·1	(*a.*) 52·10
(*b.*) 1,483,811 13	(*b.*) 4·72	(*b.*) 50·16
(*a.*) 1,191,191 18	(*a.*) 3·78	(*a.*) 44·38
(*b.*) 1,080,778 6	(*b.*) 3·43	(*b.*) 41·99
(*a.*) 1,107,826 17	(*a.*) 3·47	(*a.*) 43·31
(*b.*) 942,976 10	(*b.*) 3·11	(*b.*) 40·64
(*a.*) 1,093,310 14	(*a*) 3·42	(*a.*) 44·20
(*b.*) 940,915 17	(*b.*) 3·12	(*b.*) 41·76
(*a.*) 1,281,102 17	(*a.*) 4·02	(*a.*) 47·62
(*b.*) 1,173,027 10	(*b.*) 3·68	(*b.*) 45·43

FORESTRY IN UNITED STATES OF AMERICA.

Dublin, Jan. 8, 1884.

SIR,—The following extracts have been kindly furnished to me by Mr. J. H. Fitzgerald. I shall be obliged if you will place them on record, as all that bears upon forestry is of special importance at this time.—Faithfully yours,

ROBT. D. LYONS.

31, *Belgrave Road, Rathmines,*
Jan. 7, 1884.

MY DEAR DOCTOR,—Referring to your letter in the *Freeman* of the 5th inst., on the subject of forestry, I have much pleasure in sending you the annexed extracts from 'Report upon Forestry,' prepared under the direction of the Commissioners of Agriculture (U. S. America), in pursuance of an Act of Congress, approved August 15, 1876 (published at Washington Government Printing Office, 1878).

The Report is furnished with a very valuable Index, which much facilitates reference, and will, I think, be found to contain all or nearly all that you expect to gather by aid of the Foreign Office; besides it affords a manifest saving of time to you in the good work which you have so much at heart.—Yours faithfully,

JOSEPH H. FITZGERALD.

R. D. LYONS, Esq., M.D., M.P.,
Merrion Square West, Dublin.

UNITED STATES OF AMERICA.

Forty-fifth Congress, Second Session.

Resolved by the House of Representatives (the Senate concurring):—'That there be printed 25,000 copies of the Report upon Forestry, transmitted by the President to Congress from the Commissioners of Agriculture, on the 13th day of December last: 15,000 copies thereof for the use of the House of Representatives, 7,500 for the use of the Senate, and 2,500 copies for the Commissioner of Agriculture; provided, however, that the total number of pages of said report shall not exceed six hundred and fifty.

'Passed by the House of Representatives, March 26, 1878.

'Passed by the Senate, April 4, 1878.'

'Department of Agriculture,
'Washington, D.C., *Dec.* 13, 1877.

'Sir,—By the provisions of "an Act making appropriations for the legislative executive and judicial expenses of the Government for the year ending June 30, 1877, and for other purposes," approved August 15, 1876, the Commissioner of Agriculture was required to appoint some man of approved attainments, and practically well acquainted with the methods of statistical inquiry, with a view of ascertaining the annual amount of consumption, importation, and exportation of timber and other forest products; the probable supply for future wants; the means best adapted to the preservation and renewal of forests; the influence of forests upon climate; and the measures that have been successfully applied in various countries for the preservation and restoration or planting of forests, and to report upon the same to the Commissioner of Agriculture, to be by him transmitted in a special report to Congress.

'On the 30th of August, 1876, Hon. Frederick Watts, then Commissioner of Agriculture, appointed Dr. Franklin B. Hough, of Lowville, Lewis County, New York, to the discharge of this important duty.

'Dr. Hough seems to have diligently prosecuted his investigations and inquiries, not only throughout the United States, but also in foreign lands, entering into a correspondence with officers of foreign Governments connected with the forest management and forestry schools in Europe, where the vital importance of this great interest is well understood, and where for many years an intelligent and settled policy has prevailed, looking to the increase of the woods.

* * * * *

'(Signed) William G. Le Duc,
'Commissioner of Agriculture.

'To the President.'

Mr. Ralph Carr-Ellison, who, we regret to say, died on the 4th ult., in his 79th year, at Dunston Hill, Durham, was an old subscriber and a contributor to our columns. He was a great lover of trees.

PLANTING ENTERPRISE IN THE WEST INDIES.

II.

THROUGH the agency of the Royal Gardens at Kew, an institution to which the West Indies is especially indebted, numerous varieties of sugar-canes have been introduced, many of which have proved of great value. Recently, a large and successful consignment of new sugar-canes was received in Jamaica, from Mauritius, which promises to yield several new and productive canes. The consignment consisted of 44 varieties of canes carefully selected by Mr. John Horne, F.L.S., Director of Gardens and Forests, Mauritius.

Mr. Horne, having given special attention for many years to the selection and cultivation of sugar-canes, was commissioned by the Chamber of Agriculture in Mauritius to make a selection of the best sugar-canes found in Australia and the islands of the Pacific, and forward them for experimental purposes to that island. This Mr. Horne did during the years 1877-78, finally closing his labours in Fiji. From the canes thus obtained, Mr. Horne, by permission of the Government of Mauritius, forwarded 44 of the best varieties to Jamaica, where all but one, No. 3, have arrived safely. In forwarding these canes, Mr. Horne writes:—

'The varieties are all good strong growers, and yield a large quantity of sugar. In this latter respect I would particularly call your attention to the "Lahina" variety. I was told, when in the Sandwich Islands, that this cane yielded as much as an average of 6 tons of sugar per acre on areas as extensive as 100 acres; and 7½ tons per acre, on an average, over areas of 20 acres or less in extent. However, after the first ratoons it should be uprooted, as the second ratoons are nearly or almost worthless. The variety "Samuri" is the favourite cane with the sugar-cane planters in Fiji. It is hardy, grows rapidly, and yields sugar freely.'

While in Louisiana, U.S.A., in December of last year, I found that the Lahina cane, mentioned above, was under cultivation there, and was very favourably reported upon. I brought with me to Jamaica an additional supply of this cane for distribution, as well as supplies of two other valuable canes, known in Louisiana as the Red Ribbon and Java canes.

Turning again to the more general question of the cultivation of sugar in the West Indies, I would mention that for most of the low rich lands of our West India possessions, where the indigenous labour is abundant and cheap, as in Barbados, or where coolie emigration, to supplement the indigenous labour, is carried on systematically and successfully, as at British Guiana, Trinidad, Jamaica, &c., the cultivation of sugar is, and, I trust, always will be, a leading industry.

But taking into consideration the physical characteristics of the West Indies, the great diversity of their soils, the varying altitudes of their lands, and the great differences in their climatic conditions, if viewed aright, all these would betoken agricultural operations as varied and as diversified as the conditions herein indicated. Besides this, the lessons of the past should teach us that we cannot depend, however much we may wish to do so, upon any one single industry. Under the keen competition offered by newer and richer lands in other countries, it is our duty to look more keenly than ever into the nature and character of our resources, and, while estimating them at their proper value, endeavour to assign to each locality, and to each description of soil and climate, the industrial plants best calculated to promote the wealth of the country. As I mentioned lately, with regard to Jamaica, in our endeavours to build up a permanent prosperity for the West Indies, we should be guided entirely by their natural capabilities, and the condition of their labour supply: and, in the light of what is done under similar circumstances in other countries, endeavour to turn to advantage all such natural gifts as lie around us. The history of all essentially agricultural communities teaches us there is safety only when we plant many things; or, in plainer words, in agriculture, as in other commercial enterprises, it is not wise to 'place all our eggs in one basket.'

If we introduce and cultivate too exclusively any particular plant of commercial importance, it always happens, sooner or later, that some predatory organism, vegetable or animal, fastens upon it, and often entirely destroys our expectations of reward. Such has been the general experience with regard to sugar, coffee, the grape vine cotton, wheat, hop, and the potato. They have all suffered more or less from such visitations, and the moral is that we cannot disturb the natural conditions of their growth—as we often do by injudicious cultivation over extensive areas—and violate the order of nature for our profit, without finding consequences often entailed which are very much to our hurt.

Possibly the depression which overtook the West Indian sugar industry, like that which now has overtaken the coffee industry in Ceylon, if viewed aright, was a blessing in disguise. Be that as it may, I believe it is now pretty well understood and acknowledged that the West Indies, to be prosperous, must grow many things besides sugar; and, as it has the capabilities to grow, with profit and success, such valuable products as coffee and cacao, tea and cinchona, spices of all kinds, such as cinnamon and nutmeg, cloves and cardamoms, black pepper and vanilla, ginger and arrowroot, jalap and sarsaparilla, fibres and oils, india-rubber and tobacco, dye woods and cocoa-nuts, as well as the finest and most luscious tropical fruits, we should devote proportionate attention to each of these valuable products, and endeavour to fortify ourselves against fluctuations of markets, falling off in the demand for certain products, as well as against all the predatory visitations of animal and fungoid organisms which too often attend a too exclusive effort to take advantage of the vegetable wealth of Nature.

A very common impression exists, that most of the rich soil of the West Indies has been already under cultivation, and that, in many respects, it is almost exhausted. How far this is borne out by facts will appear from the following. In British Guiana, for instance, cultivation, so far, is wholly confined to about a dozen or fifteen miles along the sea coast; while the vast, rich lands of the interior are wholly untouched. In Trinidad, according to an official estimate, 'less than one-tenth of its area is cultivated, and its resources are developed only to a small extent.' Out of an estimated extent of 1,280,000 acres of splendid 'cohune ridge' or alluvial virgin soil, in British Honduras, according to a late return, only some 10,000 acres, or less than one-hundredth part, is, or has been, under cultivation. Coming to the older and more settled Colonies, as they have been for the most part under cultivation in sugar, lands on the lower slopes of the hills and in the plains only, have been chiefly worked. The bulk of the hill lands, most of which possess magnificent soil and a splendid climate, has been practically untouched.

For instance, in Jamaica, on the northern slopes of the Blue Mountains, there are, at the present time, about 100,000 acres of land in virgin forest, richer and finer than any now cultivated, admirably adapted for the growth of tea, coffee, and cinchona. At lower elevations, in the central districts of the Island, to the west, I estimate that above the range for sugar, there are fully 200,000 acres suitable for the cultivation of oranges, cacao, spices, and most tropical produce.

In the neighbourhood of Spanish Town, and within easy reach of railway facilities, the Rio Cobre irrigation works embrace an extent of country equal to about 50,000 acres, now mostly in pasture and ruinate, but admirably adapted for the cultivation of bananas, oranges, cacao, and spices.

In the Lesser Antilles, to the west and south, similar circumstances are found, and indeed throughout the West Indies you will hardly find a single island without plenty of unoccupied land suitable for the growth of either sugar, cacao, coffee, spices, tobacco, or cocoa-nuts. Barbados, and possibly Antigua, are the only islands of any importance which have no hill lands still available for cultivation; but with regard to the former, as I have elsewhere remarked, 'the rich character of the soil in Barbados, and the successful results of the high culture it has received,' may be gathered from the fact that, while the *Sugar Planter*, a paper devoted to the interests of the sugar industry in Australia, gravely discusses the exhaustion of canefields, the *Planters' Journal*, of Barbados, somewhat facetiously remarks that 'the land of this island, even now, shows no sign of exhaustion, although it was converted into canefields within a measurable distance of Noah's flood.'

In Dominica, the president, Mr. Eldridge, in the Blue Book Report for 1879, refers to the facilities for obtaining land in that beautiful island, 'unsurpassed in Her Majesty's dominions for fertility.' Large tracts of these lands, in the interior, belong to the Crown, and they can be purchased at an upset price of £1 per acre. Another official report states that 'at least one-half the total area of Dominica is available for agricultural purposes, amounting to about 96,000 acres . . At the present moment there is not a third of that extent under cultivation.'—(Report on Coffee Cultivation in Dominica.)

Coming further south, Grenada has a considerable area of mountain land available for cultivation; while at Tobago probably fully two-thirds of its area are still covered by virgin forest.

This review, necessarily rapid and general, will at least show to what a small extent really the rich and fertile lands of the West Indies have been so far utilized. In British Guiana alone, there is an area of country equal to two Ceylons quite untouched; in British Honduras we have more than the total area of the Fiji Islands; to Trinidad we could add the wealth of the Straits Settlements; and with the resources of the unworked soil of Jamaica we might emulate the prosperity of, at least, four Colonies of the size of Mauritius.

Next to sugar, rum, and molasses, the most important articles of production in the West Indies are cacao and coffee. Up to within a few years ago, these two articles were almost exclusively produced by Trinidad and Jamaica, each of which had a corresponding number of acres under cultivation, and an equal gross value of exports. For instance, in Trinidad, 25,188 acres were returned under cacao, yielding a gross export value of £270,906; while, in Jamaica, 22,853 acres were returned (in 1878) under coffee, yielding a gross export value of £271,449. Latterly, however, Grenada has become a large cacao-producing Colony, and it will shortly, no doubt, approach Trinidad in the value and extent of its exports. The success of the cacao industry in this island is very remarkable and suggestive. In a comparative statement, published in the Blue Book Report for 1879, the staple products of Grenada are thus shown :—

	1848.	1878.
Sugar	6,071 hhds.	2,580 hhds.
Cacao	3,995 bags.	24,394 bags.
Rum	2,156 phns.	113 phns.
Spices	*nil.*	50,800 lbs.

From this it appears, that while 'the cane cultivation is rapidly declining in Grenada, and less sugar is made from year to year,' the cacao industry is being increased tenfold. By these means Grenada, which was once in a languishing condition, has become one of the most prosperous of the Windward Islands. Again, in Dominica, cacao cultivation has been greatly extended, and the quality of the produce improved by fermentation and better curing. This will appear from the following:—While, in 1872, the export of cacao from Dominica was 204,773 pounds, of the value of £2,546, in 1878—that is, six years afterwards—the exports had risen to 342,945 pounds, of the value of £12,572. Dominica was once noted for its coffee industry, and in 1833 it exported 1,612,528 pounds; in 1873 this had fallen to 13,319 pounds, and in some years it has even been less than this. The impression has been prevalent that the abandonment of coffee cultivation in Dominica was entirely caused by an insect blight; but according to Mr. Prestoe, who specially reported upon the subject, 'the blight had very little to do' with the abandonment of coffee estates, which was due chiefly to the low prices and to the results attending the unsettled state of labour during the last fifty or sixty years. Dominica has, however, so many valuable resources, and enjoys so favourable a position, that it is destined to become the home of numerous industries; and I believe these only require an energetic start and suitable shipping facilities to rival any of those of the neighbouring islands. The late Dr. Imray, and his successor, Dr. H. A. A. Nicholls, have successfully introduced the cultivation of Liberian coffee, limes, india-rubber, and spices to Dominica, and the results, published in the Annual Report of the Royal Gardens at Kew, are full of interest, and most suggestive of what may ultimately be accomplished in this highly productive island.

In Jamaica, cacao cultivation, where once it was a flourishing industry, is now being revived and extended in connection with the cultivation of bananas for the United States.

It is estimated that about 1,000 acres are in course of being planted with cacao in Jamaica; and some 80,000 plants of the best Trinidad and Caracas varieties have been distributed from the Public Gardens.

As bananas and cacao thrive in exactly similar situations, and under the same system of cultivation, the returns yielded by the bananas (which bear during the first fifteen or eighteen months after planting) are more than sufficient to cover the whole cost of planting the cacao. In other words, owing to the development of the fruit trade in Jamaica, a cacao estate can be successfully established, and its working expenses entirely cleared, by the profits on the sale of bananas. Planters, seeing this, are utilizing their banana plants as nurses for the cacao plants, and hence, when the bananas cease to bear, the cacao plants will remain as a permanent cultivation and a source of continued wealth to the proprietor. As mentioned, lately, in my official report. 'where bananas obtain good prices, as in Jamaica, it is no exaggeration to say that a cacao estate can be established there under more favourable conditions than in any other British possession.'*

One of the most simple, but by no means the least profitable, of our West Indian industries, is that of coco-nuts, which to distinguish from cacao, cocos, and coca, are generally known in commerce as 'koker-nuts.' The finest nuts in the West Indies, and probably in the world, are grown on the coast of Central America; and British Honduras, in this respect, should become one of the largest and most prosperous producers of coco-nuts. Wherever there is a low, rich coast-line, not too much exposed to hurricanes or strong winds, and where there are regular and cheap shipping facilities, coco-nuts offer very advantageous means for supplementing the resources of the planter; and I know of no country where such high prices, and where such a regular demand exists for green nuts as the West Indies. Latterly as much as £6 per thousand was paid in British Honduras for coco-nuts, and very few could be had at that price. The general price for coco-nuts in the West Indies varies from 50s. to 80s. per thousand; at present they are about 70s.

It has often occurred to me that if, in the palmy days of sugar-planting in the West Indies, an effort had been made to cover the apparently barren coast lands with groves of coco-nuts, the abandoned estates, now so desolate, would have been mines of wealth to their proprietors, richer and more permanent than anything derived from sugar.

A coco-nut plantation in the West Indies, well established and in full bearing (say at the end of eight years), with sixty trees to the acre, may be safely assumed to be of the annual value of £10 per acre. The expenses of maintaining a coco-nut plantation, when once established, is practically nothing; hence the thousands of acres of land bordering the sea-coast of our West India possessions are capable of immense development.

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* For those who require a more detailed account of cacao cultivation in Jamaica see, 'Cacao, How to Grow and How to Cure it.' London: S. W. Silver & Co., 67, Cornhill.

The largest export trade in coco-nuts is, probably, from Jamaica, where in 1880 over six million nuts, of the value of £20,500, were shipped, chiefly to the United States and Europe. Next to Jamaica comes Trinidad, with exports of over four million nuts, of the value of £14,000. British Guiana exported in 1879 a little over a million coco-nuts, but it is probable that this number has been greatly exceeded. It is remarkable that localities possessing such wonderful facilities for the cultivation of coco-nuts as the Windward and Leeward Islands should, up to the present time, do little beyond supplying their own wants. Dominica, with its unrivalled lands for the cultivation of this valuable palm, does not export a single nut. Barbados is in a worse position, for she has to import coco-nuts for her own use. Whether this is due to want of cultivation, or to the unsuitability of the soil and climate to the growth of the plant, is not known. I believe the coco-nut palm at Barbados is affected by an insect pest; but if this is the only deterrent to the cultivation of so useful and so valuable a plant, I believe it might be overcome.

The manufacture of 'copra,' the kernel of the coco-nut dried and cured, has not been taken up in the West Indies; nor has the manufacture of coco-nut oil or coco-nut fibre been established. These industries are chiefly confined to the Pacific Islands, to the Seychelles, to Ceylon, and to countries remote from good markets for fresh nuts, and where the value of the nuts is below 40s. per thousand. Owing to the lower value of coco-nuts in Ceylon, coco-nut oil can be actually manufactured there and shipped and sold in the West Indies at a lower rate than we can make it ourselves. If, by making the nuts into copra, the West Indian planter obtains only some 40s. per thousand for them, and if, by making them into oil, he only just clears his expenses, it is manifestly to his interest to dispose of the nuts in the green state, and especially at present prices of 70s. per thousand. For the American market the nuts must have the outer husk removed; and latterly it is found more convenient and economical to ship the nuts in a similar state to the English market. In the latter case, the nuts are packed in gunny bags, and forwarded as merchandise instead of as 'dunnage.'

In the Bahamas, 'the Madeira of the United States,' the cultivation of tropical fruits, especially pine-apples, bananas, oranges, and coco-nuts, has assumed considerable importance. Under the fostering care of a former governor—now Sir William Robinson, K.C.M.G., —and a system of local boards of agriculture, tobacco, onions, tomatoes, and numerous other small industries, have also been started, which must eventually, in the aggregate, add greatly to the prosperity of these islands. The pine-apple trade of the Bahamas, chiefly confined to New Providence, is carried on both with England and the United States, a large proportion of which is in canned goods. The coco-nut plantations are confined chiefly to Inagua and islands to the south, whence the nuts are conveniently and easily shipped. At the Turks and Caicos Islands in the neighbourhood, now under the Government of Jamaica, a very praiseworthy and energetic effort is being made by Mr. Llewelyn, the Commissioner, to cultivate oranges, pine-apples, and fibre-plants, which, so far, promises to be well seconded and supported by the inhabitants.

The fruit trade of Jamaica has now become an established industry, which is rapidly being taken up by both European and negro settlers. Nearly the whole of the fruit is shipped to the United States, to the ports of New York, Philadelphia, and Baltimore. Some of the trade is, however, in course of being diverted to New Orleans, which is within only three days of Jamaica, and in close communication with all large centres of industries in the Western States. The fruit trade of Jamaica, inasmuch as it fosters and strengthens other and more permanent industries, is deserving of every encouragement; and it is no doubt with this view the Government has promoted facilities for the employment of contract steamers between Jamaica and the United States, so as to find a ready and expeditious market for the produce. As shown, when discussing the prospects of cacao cultivation in Jamaica, the profits arising from the sales of bananas, for instance, enable planters to establish the land in cacao, and similarly the same facilities are offered for the cultivation of Liberian coffee, spices, india-rubber, and numerous other plants which would otherwise be beyond the reach of persons possessing small means. The present position of the fruit trade in Jamaica will appear from the following table of exports for the year 1882:—

Fruit.	Quantity.	Value.
		£
Bananas	887,370 bunches	88,737
Oranges	35,456,978	33,684
Coco-nuts	2,763,655	10,225
Lime-juice	78,820 gals.	3,941
Pine-apples	8,886 doz.	1,111
Limes	890 bls.	348
Mangoes	150,671	146
Tamarinds	7,696 lbs.	96
Plantains	20,412	57
Shaddocks	36 bls.	14
Total	——	£138,359

The great increase in the value of this trade during the last ten years may be gathered from the fact that in 1873 the export value of fruit shipped from Jamaica was only £8,750. That it will still continue to increase, and that, ultimately, numerous other industries will be promoted by it, is proved by the fact that greater attention is continually being paid to it; and by the increased demand which is arising in the United States and the Dominion of Canada for tropical fruits. These countries possess a prosperous population, nearly double of that of the United Kingdom, and fruit of all kinds forms an important element in their daily food.

For men with only moderate capital, I know of no industry so promising as this cultivation of fruit, either for its own sake or for the purpose of ultimately establishing other and more permanent cultivations.

The cultivation of spices, such as nutmegs, cinnamon, cloves, black pepper, and vanilla, has also been taken up, not only in Jamaica, but also in Trinidad, Grenada, and St. Vincent. Nutmegs especially do well at Grenada; and with regard to other spices, if they are so successfully and so energetically carried on throughout the West Indies as in the islands above-mentioned, we shall have them known in the future, not as the sugar islands, but as the spice islands of the West.

With regard to the yield from nutmeg trees in Jamaica, trees at six years old give a return of about 1,500 to 2,000 nutmegs per annum. With trees, say, 30 feet apart, and allowing one-third to be male or barren trees, this would give a return of $1{,}500 \times 30 = 45{,}000$ nutmegs per acre. Taking an average of ninety nutmegs to the pound, the return in cash value would be 500 pounds of nutmegs at, say, 2*s.* per pound, equal to £50 per acre.

In the Botanic Gardens, Trinidad, the yield per tree net in the market has been over twenty pounds (at ninety to the pound this would be 1,800 nutmegs), with an average price of 2s. 2d. per pound during the year. The value here, per acre, is at the rate of £60 per annum.

In both the above instances, it is only fair to mention that the calculations have been based on a comparatively small number of trees. The average yield over a large area of, say, 40, 50, or 100 acres would be correspondingly lower; but, even under any circumstances, it is evident that, where suitable and favourable circumstances exist, as I believe they do in the West Indies, a nutmeg plantation is likely to be a very successful and remunerative undertaking.

The cardamom, a valuable East Indian spice, has lately been introduced to the West Indies with satisfactory results. It is adapted for cultivation in moist, shady situations, at elevations ranging from

2,000 to 3,500 feet. The plants have much of the appearance of the 'wild ginger' of the West Indies, and require little cultivation beyond keeping the ground clear of rank-growing weeds. The return per acre is estimated, at the end of three years, at about 170 pounds of cardamoms, worth 3s. to 4s. per pound.

Tobacco, rubber-yielding plants, and numerous medicinal plants are also being introduced and cultivated in the West Indies with marked success. With the valuable aid and by the instrumentality of the Royal Gardens at Kew, the Botanical establishments in the West Indies, and through them the planters in these possessions, are being continually supplied with economic plants of great value, and by these means new industries are being founded, which in course of time should have most beneficial influences upon the commercial prosperity of these islands.

So far, tea has not been tried on a commercial scale in the West Indies. I have some five acres of tea under my care, which, being some seven or eight years old, indicates that the climate of Jamaica is admirably suited to the growth of the plant. I estimate that, with indentured coolie labour and an experienced tea-planter from Ceylon or India, tea might be grown in the West Indies and placed in the market at a cost not exceeding 7½d. or 8d. per pound. At the present time, very inferior China tea is sold in the West Indies at 4s. 6d. per pound. Hence there is here a very good opening for a tea industry —if only to supply local demands. I am glad to say that an attempt is likely to be made to grow tea in Jamaica, under very favourable circumstances; and, as the parish of Portland, with its warm, moist climate and splendid rich valleys, approaches so nearly the conditions which obtain in the best tea districts of India, the undertaking promises every hope of success.

Among the newer industries of Jamaica, I may mention that of cinchona, or the quinine-yielding trees of commerce.

For the first seeds of cinchona, Jamaica is indebted to the Home Government, who, at the recommendation of Sir J. D. Hooker, Director of the Royal Gardens, Kew, sent liberal supplies of seeds of three species direct from Perú and Guayaquil. The industry owes its initiation, on a commercial scale, to Sir John Peter Grant, who established an experimental Government plantation on the Blue Mountains in 1869.

For several years, and, indeed, up to the close of 1879, cinchona cultivation had not been taken up by private planters. The number of plants grown by private enterprise in the whole island, up to 1880, would probably have not exceeded 900 or 1,000 plants: that is, a number barely sufficient to cover an acre of land. Owing, however, to the favourable results of the sales of cinchona bark grown on the

Government plantations during the last three years, and to the facilities afforded by Government, in raising and distributing seeds and plants on a large scale, private enterprise has now been largely enlisted in the industry.

As indicating what has been done on the Government plantations, I may mention that up to a recent date they had cost, including all pioneering and experimental work, about £16,000. The sales of cinchona bark and cinchona seeds and plants have yielded a return of £12,000; whilst the plantations, as they now stand, have been valued by experienced planters from Ceylon at £20,000.

In my Report for the year ending September 30, 1880, I mentioned that the object of the Government in maintaining these plantations was not on account of the pecuniary returns likely to be yielded by them, but for the purpose of showing that cinchona barks of good quality could be successfully grown in Jamaica; and, also, that cinchona planting, as an enterprise in private hands, possessed all the elements of a sound and remunerative industry.

The sales of Jamaica-grown cinchona bark, during the last three years, having fully proved both these points, the Government plantations now naturally devote chief attention to the successful introduction and cultivation, on a small scale, of all the newer and richer kinds of cinchonas, for the purpose of successfully establishing them in the island; and also to such necessary experimental and scientific work relating to the industry which, for lack of means or of scientific knowledge, cannot be conveniently undertaken by private enterprise.

As already mentioned, much remains to be done in this respect; and as the plantations as a whole do not contain more than about 180 acres, this will not allow, on an average, more than about five acres for each of the twenty-five or thirty species, varieties, and forms of cinchona bark now the subject of careful experiment and investigation on these plantations.

In order to test the commercial value of Jamaica-grown bark, no better plan could be followed than to send it, in lots, to the open market, and place it in competition with barks from other countries. That it has so satisfactorily stood this test, and brought in a large return on the outlay, and, moreover, that the results of the sales have induced cinchona planting to be undertaken in the island, by private enterprise with energy and success, are matters for which the Government, no less than the general public, are to be congratulated.

Three years ago, the kinds of cinchona bark under cultivation in Jamaica were only three, viz., Cinchona succirubra, Cinchona officinalis, and the so-called Cinchona calisaya, now proved to be identical with Cinchona hybrid or robusta of Ceylon and India.

Since that time numerous kinds have been introduced which are now the subject of careful experiment to determine the most favourable circumstances of soil, elevation, rainfall, and aspect, suitable for their successful cultivation, the best methods for harvesting the bark and inducing the largest formation of alkaloids, as well as determining the simplest and most economical methods for their general treatment and management.

Among the kinds of bark now under experimental cultivation at the Government plantations in Jamaica are :—

Red Barks—Cinchona succirubra; Cinchona succirubra, var. sub pubescens.

Crown Barks—Cinchona officinalis; Cinchona officinalis, var. uritusinga; Cinchona officinalis, var. Bonplandiana; Cinchona officinalis, var. crispa; Cinchona officinalis magnifolia; Cinchona officinalis pubescens.

Hybrid Bark—Cinchona hybrid or robusta.

Ledgeriana Bark—Cinchona Ledgeriana.

Yellow Barks—Cinchona calisaya; Cinchona calisaya, verde; Cinchona calisaya, var. Josephiana; Cinchona calisaya, var. Javanica; Cinchona calisaya verde; Cinchona calisaya, morada form.

Grey Barks—Cinchona Peruviana; Cinchona nitida; Cinchona micrantha.

Carthagena Bark—Cinchona lancifolia.

Cuprea Bark—Remija pedunculata (?).

The cinchona industry of Jamaica, as indicated above, has now entered upon a practical phase, and plantations are being opened by private parties on a large scale. During the last two years the Government has sold twelve patents, or runs of high forest land containing some 5,000 acres, under conditions which involve that, at least, one-sixth shall be planted with cinchona at the end of five years.

Besides this, some 2,000 acres—portions of the higher coffee estates suitable for cinchona cultivation—are being gradually opened by their proprietors; so that in a few years valuable and extensive cinchona plantations will be thoroughly established in the island.

These cinchona plantations in Jamaica will probably remain for many years the only successful cinchona plantations in the New World. No cinchona can be grown in any portion of the United States territory—which is entirely outside the tropics. In all the other British West India Islands, there is no suitable land, as far as I am aware, possessing the requisite elevation, soil and climate for the successful cultivation of cinchona. It is very unlikely to thrive in either British Honduras or British Guiana, and although much has been written and said respecting the systematic cultivation of cinchona, in its natural home in the South American States, I have entirely failed, so far, although I have met many men who have travelled through those States, interested in the subject, to hear of any plantation possessing, say, one hundred acres systematically established with this valuable tree.

The fact is, that for the successful and remunerative culture of cinchona plants in a new country such a peculiar combination of elevation, soil, and climate is requisite, that there are, comparatively, few areas wherein all these can possibly exist. Hence, we find that very few tropical countries can successfully enter upon the industry, and of these, so far as my experience goes, only two or three possess in so eminent a degree all the favourable conditions enjoyed by Jamaica.

As confirming this view by independent testimony, I may mention, that a Ceylon proprietor and planter, with some twelve years' experience in the cultivation of coffee and cinchona, after carefully inspecting the Jamaica Government plantations, refers to the growth and characteristics of the trees as follows: 'I am perfectly convinced that were the bark of two equal-sized Cinchona trees, one Ceylon, the other Jamaica, weighed, the Jamaica tree would outweigh the Ceylon tree considerably: this is particularly noticeable in young trees. The bark itself has a brighter and more taking colour, looks richer in quinine, and altogether healthier. It is generally (copiously) covered with lichen, and the growth of this I believe to have an effect similar to mossing in developing the alkaloids. The ready way in which the self-sown seedlings grow, and the number of them, surpass anything I have seen in Ceylon, and prove that the Cinchona tree has found a most suitable home and congenial climate on the Blue Mountains of Jamaica. The land is self-drained, yet canker in the root, which destroys such a large proportion of Ceylon seedlings, is hardly felt, and would not probably be known were the land drained. The only difficulty I can foresee is labour; if this were removed (as it easily might be, by importing coolies) I believe Jamaica would produce more valuable cinchona bark for the acreage than any country in the world.'

The cost of establishing cinchona plantations in Jamaica, is estimated at £35 per acre, which includes the purchase of land and all expenses up to the end of the fourth year, when the first crop of bark may be taken. The total yield of the plantation (deducting cost of barking, curing, and shipping expenses), up to the end of the ninth year, will probably be not less than £175 per acre against a total outlay for planting operations for that period of about £50 per acre.

The estimate of cost is based upon land at about 5s. per acre, and Creole labour at existing rates, viz., men 1s. to 1s. 4½d. per day;

women 10½d. to 1s. per day. The estimate of return is based on an average of 2s. per pound being obtained for the bark of all ages, which is practically only one-half of that actually realised by Jamaica-grown bark during the last three years.

In addition to the experimental cultivation and investigations respecting cinchona plants, an attempt is being made to manufacture cinchona febrifuge in the island for the purpose of placing this valuable but cheap preparation within reach of Her Majesty's subjects in the West Indies. This local utilisation of the Government cinchona plantation, in Jamaica, is one which has long been kept in view, and should cinchona febrifuge be successfully and economically manufactured there, the plantation will be able to render an additional service in supplying, on the spot, the means for combating sickness and disease, and effectually coping with the scourges of fever which occasionally visit it. 'This object, amongst others, has, I believe, been always in contemplation by the Home Government in encouraging cinchona planting in the Colonies; and it is an aim so noble and benevolent that it deserves the sympathy and support of all concerned.' For, as one writer has well expressed it, 'To England, with her numerous and extensive Colonial possessions, cinchona bark is simply priceless; and it is not too much to say that if portions of her tropical empire are upheld by the bayonet, the arm that wields the weapon would be nerveless but for cinchona bark and its active principles.'

At the small but beautiful island of Montserrat, in the Leeward Islands, which for a long time was in a languishing condition, new life and energy has been infused by the successful issue of an industry which a few years ago was confined to the desultory and spasmodic efforts of a few negroes. I refer to the lime-juice plantations and manufactory so ably and systematically established at Montserrat by the Messrs. Sturge. And I would here add, that the example of the Messrs. Sturge, not only in selecting and systematising the cultivation of a minor West India product, but in conferring great benefits upon the locality generally, deserves the warmest commendation. It is a somewhat remarkable fact, that while, at the time the Messrs. Sturge took up the cultivation of limes at Montserrat, in 1868, 'the whole of the northern portion of the island had gone out of cultivation, and the export of sugar had gradually fallen from some 2,700 hogsheads to 950 hogsheads, while the white population had declined to about 240 persons, the effects produced by the energy and example of the Messrs. Sturge have infused new life and energy to other industries. For instance, the cultivation of sugar has been greatly extended and improved of late years, and the exports have been increased to some 2,500 hogsheads; that is, nearly to what they were a hundred years ago, when 7,000 slaves were kept on the island.'

The Lime plantations of the Montserrat Company occupy about 1,000 acres, and contain about 200,000 trees of all ages. The export of lime-juice, both crude and concentrated, is now nearly 100,000 gallons per annum.

The Lime tree (*Citrus limetta*), a member of the orange family, grows well in all the West India Islands. It requires a light, loamy and somewhat stony soil, and an elevation, depending upon latitude, from sea level up to 500 feet. The trees are planted at 15 feet apart, giving about 200 trees per acre. They come into bearing in about six or seven years, but light crops are often gathered from trees at five years. To ensure large and permanent crops, the trees require to be regularly pruned, and to be kept free from all parasitic growths, such as Loranthus, &c. They are also greatly benefited by tillage: that is, loosening of the soil around the roots, and being kept free from grass and weeds.

The annual mean temperature of Montserrat at sea-level is given at 78° F., and the annual rainfall at 59 inches. These conditions are evidently those most suitable for the successful cultivation of Lime trees, for at Montserrat the Lime orchards present a most beautiful sight.

With regard to the manufacture and preparation of lime-juice, I cannot do better than quote the following description which appeared in the *Pharmaceutical Journal* in January last (3rd Series, No. 657, p. 606) :—

'In Montserrat the lime fruit harvest is heaviest from September to January, but a good supply of fruit is yielded throughout the whole year. Here, where the Lime tree is specially cultivated for the sake of the juice, the work is done in a systematic manner with suitable machinery. The fruit, after collection, is taken to two central factories, where it is sliced by water power, and then squeezed in huge wooden presses, the juice being run into puncheons and quickly bunged up. This is a most important point in preparing the juice in a tropical climate, for if exposed it would rapidly decompose. I am also inrormed that the choicest fruit is alone used, and that only about two-thirds of the juice is pressed out, thus ensuring greater freedom from mucilaginous and pulpy matter. The further pressings, together with the juice of unsound fruit, is evaporated to the consistence of treacle, and sent over to this country for the manufacture of nitric acid.

'It is chiefly owing to these precautions that Montserrat lime-juice is so much superior to that produced in Jamaica and elsewhere, where no care or supervision is exercised in its preparation.'

It might not, for many reasons, be advisable to follow the example of the Montserrat Lime-juice Company as regards this particular industry, for the demand for lime-juice is somewhat limited and precarious, but with so many other West Indian industries ready at hand, there can be little difficulty in founding hundreds of industries as successful and as promising as that of the Montserrat Lime-juice Company.

Turning now to British Honduras, which is closely connected with the West India Islands as being a dependency of Jamaica, I may mention that I lately had the pleasure of visiting it, at the request of the local Government, for the purpose of inquiring into its 'flora, and the natural resources of its soil.' My official report has lately been completed and presented, and as, probably, it will shortly be published, I need not dwell now at any particular length on the subjects treated therein.

By permission of Colonel Sir Robert W. Harley, the present Administrator of British Honduras, I am, however, enabled to lay before this meeting many interesting facts connected with the country, which I believe will place this hitherto much maligned and much neglected Colony in a new and not unfavourable light.

Up to a recent date British Honduras was merely a settlement for the purpose of cutting logwood and mahogany, and it was not until 1862 that it was raised to the dignity and importance of a British Colony.

Speaking of the want of accurate scientific knowledge of the natural resources and capabilities of British Honduras, the *Colonial Guardian*, published at Belize, recently remarked:—

'We have for a sufficiently long period lived without a knowledge of the capabilities of about three-fourths, and in total ignorance of even the physical configuration of more than one-half of the Colony. We have been willing quietly to allow, without a contradictory murmur, the climate and soil of British Honduras to be slandered, until the civilised world has come to look on her as a vast pestiferous swamp, unworthy the habitation of civilised man. So long as mahogany was plentiful and brought good prices, little did the more wealthy colonists reck whether this continuous slandering of her soil barred the way to colonisation. But fortunately mahogany is failing, and dire necessity is driving them to think of agriculture and of its only hope of development—immigration, as the true foundation of her progress. But the long lethargy has borne evil fruits, and British Honduras is only thought of in Europe as another Europeans' grave not dissimilar to the pestilential coast of Western Africa. To disabuse the world of this erroneous opinion will be no easy task, unless we can lay before it substantial proofs of our statements.'

British Honduras contains an area of 7,562 square miles, that is, more than four times the size of Trinidad, nearly twice the size of Jamaica, and almost equal to that of the whole of the British West India Islands proper put together. A large portion of the country is practically unknown, but excluding the low swampy ground on the cays and some portions of the coast, and allowing a large proportion of the interior rocky country as being unfit for cultivation, there remain extensive areas of magnificent virgin soils in British Honduras, equal, if not superior, to anything else in the West Indies. As shown on the map, British Honduras has a seaboard of about 250 miles, stretching from the River Hondu on the north, abutting on Yucatan and Mexico, to the River Sarstoon on the south, bordering on the Republic of Guatemala. In general, the land rises from the sea-coast, in a gentle slope towards the west, intersected by numerous deep and navigable rivers, until it meets, on the frontier line, the dividing mountain zone of Central America.

In the south, however, the Cockscomb Mountains and others are within some forty miles of the sea, and hence the country here is greatly diversified with hills and valleys, most of which are practically unexplored. A few years ago (1878), Mr. Fowler, the Colonial Secretary of British Honduras, made a journey through the South-western portion of the Colony, of which an interesting account is given in 'Papers relating to Her Majesty's Colonial Possessions' presented to Parliament: [c—2598] of 1880. Mr. Fowler went up the Belize River as far as the western frontier, and then made an oblique cut across the country at the back of the Cockscomb Mountains, eventually reaching the coast at Deep River. The country traversed 'proved to be a succession of valleys and hills from 1,200 to 3,000 feet above the sea level. The westerly portion was an open, undulating, grassy country forming magnificent pasturage lands. Towards the coast, it was all forest, full of valuable timber. No inhabitants were seen, but ancient Indian ruins consisting of large stone buildings were discovered. The soil generally was rich, but a few rugged spots were encountered.'

Without anticipating, in the least degree, the information contained in my official report, I may mention that I travelled some nine hundred to a thousand miles in the Colony, and thanks to the courtesy of the Government and to the kindness and hospitality I everywhere received, I was enabled to accomplish the objects of my visit under very favourable circumstances. My first journey was through the settlements to the south of Belize, in which I had the privilege of being accompanied by Captain Marriner, chief of the local police, who, I greatly regret to find, has since lost his life on the River Hondu.

Besides several large sugar estates in good order, numerous cocoanut and banana plantations are being established along the banks of the rivers to the south, many of them by small local companies with capitals ranging from £2,000 to £5,000. Steamers from New Orleans periodically call at the principal settlements, and take off the produce, paying high rates in cash as soon as deposited on board.

One of the most interesting spots visited in this journey was the Toledo settlement, established several years ago by settlers from the Southern States of America. About fourteen families came here and took up their quarters in the virgin forest, with little or no capital. But, by undaunted courage and perseverance in overcoming the first difficulties, they have succeeded in establishing comfortable homesteads, and in placing under cultivation, chiefly in sugar-cane, some six hundred acres of land. The results of this experiment are in many respects very suggestive. Although, in tropical countries as a rule, and especially, as in this case, at sea-level, the white man is not suited for hard, laborious work in the sun, and it is better for him to possess capital and to employ negroes and coolies, yet it speaks well for the climate of British Honduras that the white settlers at the Toledo settlement, which is by no means exceptionally placed, should by their own hands have turned a wild tropical forest into a number of rich and prosperous plantations. Most of the settlers, at present, grow sugar-cane, and manufacture the produce into common Muscovado sugar in open pans. The quality of the sugar is exceptionally good, most of which is sold locally at prices ranging from 5 to 6 cents. per pound.

I returned from the southern settlements deeply impressed with the vast natural resources of the country, and the great future which lies before it when properly opened.

I next visited the central and western districts of the Colony. This country generally, with the exception of a few isolated ranges, rises so very gradually from the sea coast to the interior, that points on the western frontier, nearly one hundred miles from the coast, are only three hundred feet high. This low, gently sloping land is also plentifully intersected by deep navigable rivers which flow slowly towards the sea. Along the banks of these rivers the characteristics of the soil and climate were of a most favourable character and the vegetation essentially tropical and luxuriant. On further acquaintance with the interior portions of the country I found that the alluvial deposits along the river banks, extending some five or six, or in some instances some ten miles on each side, contained, chiefly, the rich valuable soils of the Colony. Beyond these were 'broken lands' and 'Pine ridges.'

The most important, as well as the richest river valley in the Colony is that of the Old River, sometimes called the Belize River. This extends in a wide sinuous course from the town of Belize at the sea coast to the Western frontier. In the upper portions, the valley widens into broad expanses of rich fertile plains covered by cohune palm, in some cases thirty or forty miles in breadth. I carefully examined this district, and worked my way to the frontier station—the Cayo—near which a coffee plantation has recently been established. With the exception of some six sugar estates, and the same number of banana plantations, this coffee plantation is the only attempt hitherto made to establish a systematic course of culture in the Colony, the bulk of the people being employed, and the chief trade of the Colony depending upon mahogany and logwood cutting, which when good prices are ruling, are apparently very remunerative industries.

In the forests of the western districts I found the rubber-tree of Central America (*Castilloa elastica*) very abundant. This tree (a member of the Breadfruit family) is specially suitable for cultivation, on account of its preferring a loamy, sandy soil; and being a deep feeder it might be utilised as a shade tree in cultivated areas with great advantage. Trees at ten years old yield from four to seven pounds of rubber, which is valued at from 2s. 3d. to 3s. per pound. If carefully managed, the trees can be tapped every three or four years.

Another interesting plant, found wild in these forests, was the indigenous cacao of Central America: this differed from all kinds I had met previously. After careful inquiry, I found that it was the Tampasco cacao of the Atlantic slopes, and identical with the celebrated Socunusco cacao of the Pacific coast. In habit and character the trees approach those of the Cacao Criollo, and an examination of the pods, which are of a golden-yellow colour, led me to the conclusion that this Tampasco, or 'Socunusco' cacao, is the yellow form of the celebrated 'Caracas' cacao. Should such prove to be the case, there is little doubt that this yellow variety will prove as much superior to the red (Caracas) form, as the yellow Forastero does to the red (Trinidad) cacao.

Many other interesting plants of timber and dye woods, as well as of plants of medicinal and economic value, were met, many of which I have no doubt are capable of being utilised both in British Honduras and in otherBritish possessions.

With regard to the climate of British Honduras, to which I have already made a passing reference, there is no doubt in my mind that it has been greatly maligned. Belize, the capital, being surrounded by mangrove swamps, 'is possibly the least healthy part of the colony.' On the gradually rising ground of the interior the climate is equal, if not superior, to most tropical countries. Visitations of fever appear to be of rare occurrence, and owing to the level character of the country, the cool sea-breezes—especially those from the north-east—sweep uninterruptedly over it, entirely preventing the accumulation of miasmatic influences, so prevalent in other countries similarly situated.

That the legislature of British Honduras has a firm belief in the healthiness of the Colony is shown by the fact that a local ordinance, referring to the registration of medical practitioners, has a preamble somewhat as follows: "Whereas, owing to the salubriousness of the climate of British Honduras, there are few inducements for medical men to settle therein, it is hereby enacted,' &c., &c.

For experienced planters, who have already lived in tropical countries, and especially in the East, British Honduras offers inducements superior, I believe, to those of most British Colonies. There are thousands of acres of magnificent land offered by Government at an upset price of a dollar an acre, capable of growing nearly every tropical product. Some of these lands are either near the banks of rivers, with easy communication with the coast, or on the coast itself. There is an abundant market for bananas, plantains, cocoa-nuts, oranges, pine-apples, and all tropical fruits in demand in America, and regular direct communication, by means of mail and other steamers, with both England and the States. For the cultivation of sugar-cane, coffee, tea, cacao, spices, tobacco, vanilla, and rice, British Honduras offers special advantages. The chief drawbacks to the advancement of the Colony are: (1) The scarcity and somewhat precarious nature of the labour supply, and (2) the want of cheap and effective communication with the rich backlands of the interior. The first of these drawbacks may in a great measure be overcome by the establishment of an effective system of coolie immigration, similar to that in force in Demerara, Trinidad, Jamaica, and more recently in Grenada. Coolies might be obtained from India at the rate of £15 per head, the repayment of which would be spread over the five years during which the engagement lasts. During this time the wages would be fixed at the rate of 1s. per diem, all things included. For light field work in the tropics the coolie is an invaluable worker. Demerara and Trinidad, without coolies, would never have attained to their present prosperous condition; and what has been done in these Colonies with coolies may likewise be done in British Honduras, which, from the richness of its natural resources, would eventually become one of the most prosperous British possessions in the West Indies.

For reaching the fine rich virgin lands on the upper portions of the Sibun and Belize rivers, as well as those previously described in the South, a system of cheap and light railways might be constructed at a cost not exceeding £100,000.

The Colony is, at present, in a sound financial condition, and there should be no difficulty, as suggested by Mr. Fowler, in raising the above-mentioned sum in England, on loan, which, it may be observed, is only a little over two years' income.

Time will forbid my entering more fully upon the numberless resources of our West Indian possessions, or describing them so completely and so abundantly as they deserve. I cannot, however, close this brief and, I fear, very incomplete account of what is being done, or is capable of being done, in the West Indies without expressing confidence in the great future which lies before them, and also the hope that their abundant latent wealth will be so expanded and developed as to afford a prosperous outlet for English capital and enterprise, now too often diverted and absorbed in fruitless operations in foreign States. D. Morris.

FOREST BOTANY IN NORWAY.[1]

I.

IN the Journal of 'Forestry,' vol. ii., p. 316, are given some notices of forests and forestry in Norway. About the time when the observations then published were being made, there was published a valuable report on *The Kingdom of Norway and its People*, by Dr. O. J. Broch, President of the Norwegian Commission for the International Exhibition in Paris in 1878, in which was embodied a sketch of the vegetable products of Norway, including forest trees. And in 1879 there was published as a contribution to the jubilee connected with the 400th anniversary of the founding of the University of Copenhagen, *A Report on the Distribution of Plants in Norway*, by Dr. F. C. Schuebeler, Professor of Botany in the University of Christiania, in which is supplied much additional information in regard to forest trees, indigenous or cultivated in Norway, with plates illustrative of the appearance of these and of the form and venation of their leaves. There are given with this report, charts illustrative of the mountainous region of the country; of the coast lands of northern Norway; of the temperature throughout Europe on 1st January; of the isotherms in the month of January, and in the month of July; of the lines of minimum temperature throughout north-eastern Europe; of rainfall; of the humidity; and of the geological strata superimposed on the primitive rocks. And in the report is embodied the longitude and latitude of the most northern localities in Norway in which have been observed the indigenous growth, or cultivation, or flowering, or fruiting—it being specified which it is—of well-nigh 4,000 different plants found there. Along with a copy of this there has been received at the office of this Journal, a large map of the kingdom of Norway in four sheets, illustrative of the same, together with a corresponding map in one sheet, with coloured indications of the forests of coniferous and of broad-leaved trees in the kingdom. These were sent from the Royal University of Norway in Christiania; and in the course of this month there was received by me, from the Directory of Forest Administration in Christiania, a copy of the same map, along with three forest maps of different districts of the county of Christiania. From the whole, it appears that the broad-leaved trees are found chiefly in the west and the north-west portion of the kingdom, though by no means confined to these, and mostly on the borders of rivers and lakes and skirting the lower fringes of coniferous forests; while the forests of coniferous trees are densely diffused over the south-east and sparsely scattered over the extreme north of the kingdom.

The maps were in both cases accompanied by a Report by the Forest Directory for the period 1875-1880. The maps sent to me were also accompanied by 'a Report on the Nature and Condition of Forests in Finmark,' by Forest-Inspector Barth; 'a Report on the Nature and Condition of the Forests in Guedbrandsdalen,' by the same author; 'a Report on the Condition of the Woods in the Watercourses of Arendal,' by Forest-Inspector Mejdell; 'a Report on the Condition of Forests in Romsdals County,' by J. Schioetz; and Reports by A. T. Gloersin; and of Examination of Forests in Stavanger and the borders of Bergenus County. There had previously been received by me reports on the economical condition of the kingdom by Prefects of ninteeen Prefectures, for the years 1861-1865; similar reports for the years 1866-1870; and 'a Report made by Forest-Assistant Aars, to the Department of the Interior, on the Condition of the Forests in the Prefecture of Lister and Mandal,' published in successive numbers of the Christiansand *Stiftsavis*, in the latter months of 1870, containing saddening accounts of the reckless and hopeless destructions which were then and had been for some time, going on in the forests.

The maps and reports sent to the office of the Journal, had been forwarded through Mr. Holst, of Christiania, formerly Secretary of the University, and now Director of the *Foreign Literary Exchange of Norway*, who is prepared to supply information, to procure printed works or treatises which are to be obtained gratis, and to put foreigners engaged in any literary or scientific researches in communication with scientific men in Norway, when he cannot through the agency himself supply the desired information. An arrangement which, in connection with all I have had occasion now to state, may be considered indicative of the importance which is now being attached to forestry in Norway and of the energy with which measures relating thereto are carried out.

The true forests of Norway are composed almost exclusively of the Norway Spruce Fir and the Scots Fir. It is only exceptionally that some other trees such as the Alder, the Beech, and the Oak, though not numerous are found forming little woods.

Of the Pine, *Pinus sylvestris*, Dr. Broch reports that it is found everywhere throughout the country: in the south to an elevation of 950 and 900 metres; on the Nordre-Gudbrandsdal, 62° N. lat., to 900 and 800 metres; in the Diocese of Drontheim, 63° to 65° N., to 650 and 500 metres; in the prefecture of Nordland to 550 and 350 metres; in Finmark, 70° N., rarely at more than 200 metres above the level of the sea.

The Norway Spruce Fir, is generally known as *Abies communis*. According to Hullet, this generic name is derived from and is of the dialect of the Celtic *Abetoa*, whence *Abete* Italian, *Abeto* Spanish, &c. Hesychus, the Greek grammarian, calls it *Abin*. According to others the name is derived from the Latin *Abeo* to spring—and has been given in reference to its lofty and aspiring habit—or the Greek *Apios*, a pear tree or a pear, the name being given to this tree in reference to the form of its fruit! Amidst etymological derivations so varied I have no choice. By some it is alleged to be identical with the *Abies excelsa* of De Candolle. It is known as the *Fichtenbaum* of Germany, *Abiete* of Italy. I have found it spoken of as identical with the *Sapin* of France; but the *Sapin communis*, the Silver Fir of England, known by several other names in different districts, is the *Picea pectinata*, D. Don, and the *Abies pectinata* of De Candolle; while to the *Abies excelsa* of De Candolle the *Abies Picea* of Millaw, the *Picea excelsa* of Lank, is given the names of *Sapin rouge*, *Sapin gentil*, *Sapin épicéa*, &c., and now generally the name *Epicéa commune*.

Some confusion, says Loudon, exists in the works of modern authors respecting the Silver Fir and the Spruce, partly, as it would appear, from the circumstance of Linnæus having made an erroneous application of the names given to these trees by Pliny. The tree which Theophrastus calls *Aale*, Pliny calls *Abies*, and Linnæus *Pinus picea*, while the tree that Pliny calls *Picea*, which is our Spruce Fir, is named by Linnæus *Pinus abies*. This tree is found principally, writes Dr. Broch, in the eastern portion of the country and in the diocese Drontheim. On the west coast it is now met with growing wild to the south of 62° N., but it is found in plantations in many other places. It is only in the interior of Hordaland at

Mo, an annex of Hosanger, 60° 48′ N.; and at Voss, 60° 38′ N. that it is met with in a wild state. To the north of Cape Stat it is found at the same time with the Pine even on the islands along the coast to 65° N. lat., beyond that it becomes more rare, and it ceases to form forests somewhere near the Arctic circle. In East Finmark, on the contrary, it is found in Syd-Varanger, near the lake Kjolmejare, 69° 30′ N. lat.; but in separate trees or in quite small groups. In certain localities in southern Norway the Fir attains on mountains almost the same elevation as the Pine, but, as a general rule, its limitation of vegetation is from 60 to 100 metres below the limit of that tree.

In southern Norway the Pine and the Fir attain to their greatest dimensions, but continually the trees of great size are becoming every year more rare, in consequence of the felling of the large trees, increasing with the improvement of roads, and of means of transport. In illustration of the magnitude attained, there was felled some years ago at Lom, in Nordre-Gudbrandsdalen, 61° 53′. N., at an elevation of 560 metres, a Pine, the trunk of which near the ground had a diameter of 1·2 metre, 4 feet, and a diameter of 0·5 metre, 20 inches, at a height of 16 metres, or 53 feet 4 inches. At Nordre-Aurdal, and Valders, 60° 57′ N., there stand still two pines called the *Soesterfuruer*, or Sister Pines, of which the larger, measured in 1864, had a height of 28 metres, 93 feet 4 inches, and a diameter of 1 metre 40 inches at the height of 1 metre from the ground. In northern Norway, and especially in Finmark, these trees have less height but they present a considerable girth.

In Drangedal, in the bailiwick of Bamble, 59° 6′ N., there has been measured a Fir 31 metres, 103 feet, in height, and 0·76 metre, 66 inches in diameter, at 21 metres, 70 feet, from the ground. In 1864, there was felled in Hurdal, 60° 24′ N., at an altitude of 350 metres a Fir having a height of 34 metres, 103 feet, and at 1 metre from the ground a diameter of 1·07 metre, 41 inches. There may be counted in it 170 consecutive rings, and it was estimated that it must have been from 175 to 180 years old. In Selbo, 63° 15′ N., there was felled in 1877 a Fir having a height of 33 metres, and a diameter of 1 metre, 40 inches, at 1 metre from the ground.

The time required by the Fir and the Pine to attain dimensions of building timber, and timber for export, naturally varies much, according to the condition of growth in which they find themselves. In southern Norway it may be reckoned that a Pine of from 100 to 150 years' growth may furnish trees 5 metres, or 17 feet, of 33 centimetres, or 13 inches, diameter at the small end. In the forests of Vinger and Odal 60° to 61° N. in the valley of the Glommen, their concentric rings measured 1 centimetre, nearly half-inch; in the north part of the valley of Osterdal, on the other hand, it requires from 4 to 6 to measure 1 centimetre; the rings of the Fir being less compressed from 2 to 4 often measure 1 centimetre. In young trees the augmentation of girth as elsewhere diminishes continuously with age.

In a paper transmitted under date of September 21, 1874, to the Department of State at Washington, General Andrews, Minister from the United States to Surden, draws attention to the fact that a thing may be reckoned as worth what, under favourable circumstances, it takes to produce it, and reports:—Mr. Samson, a highly intelligent Norwegian gentleman, who has made a large fortune in the timber trade, informed me some time ago that, according to a calculation he had made, Pine and Spruce timber actually costs, and is worth much more than the price at which it is sold. His theory is, that an acre of ground timber is worth the same that the lowest or nominal price of wild land—say 1 dol. an acre—would amount to, as an invested capital, drawing interest at the expiration of the period required for timber to develop. 'In the report on Swedish forest culture, accompanying my letter No. 166,' says he, 'it was shown that on the northerly part of Surden, 200 years, and in poorer soils 300 years are required for the Pine to grow to good timber. In the south part of the country 100 years are sufficient. He says that 1 dol. invested at 5 per cent. interest per annum will double in 20 years. In 40 years it will be 4 dols.; in 60 years, 8 dols.; in 80 years, 16 dols.; in 100 years, 32 dols.; in 120 years, 64 dols.; in 140 years, 128 dols.; in 160 years, 256 dols.; in 180 years, 512 dols.; in 200 years, 1,024 dols. and thus he makes the cost of production as thus calculated.

'Assuming that one hundred and eighty years are required for the growth of Pine timber in the north-west part of the United States,' he goes on to say, 'these figures would seem to show that the Pine forests of the United States are bringing to hand trees sold and consumed at a price very much below their actual value.' I know that the same thing has occurred in other countries besides America, and that in many cases the tree was worth to the country, as a tree, a great deal more than the price obtained for it as wood!

A SUCCESSFUL STUDENT.—We are pleased to learn that the son of our esteemed contributor, Mr. A. J. Burrows, of Pluckley, Kent, has passed the students' preliminary examination recently held at the Surveyors' Institute, Great George Street, Westminster.

FORESTAL NOTES.

The Draining Power of Conifers; Effects of Grasses and Weeds.

I THINK 'An Enquirer' may safely feel reassured with regard to the draining effect of coniferæ in general, and of the Scotch Pine in particular. It is entirely beneficial, and would be better described by the expressive French term for drainage, '*assainissement*,' literally, the rendering sound, or sweetening of the soil, than by the English word 'drying,' which might be understood in an unfavourable sense as well as in a good one.

The hygrometric function of trees is the regulation and equable distribution of moisture in the air and the earth, not by any means its extinction. Their leaves intercept a portion of the rain-water as it falls; the roots absorb more of what sinks into the ground, and store it up provisionally in the tissues of the tree, until it also is sent up into the leaves; all to be aërated, and in due time evaporated through the stomata. The soil is thus saved, by the continued action of these organs, from excess of moisture on the one hand, from excess of evaporation, due to the direct influence of burning sun and sweeping winds, on the other. The number of 'Forestry' for September, 1883, contained an extract from the interesting report by Mr. Franklin Hough, on a number of meteorological observations taken in the United States, and according to which, if I recollect rightly, direct evaporation from woodland soil, covered with fallen leaves, was reduced to one-fifth of what it amounted to on open ground!

I believe that the difference in this distributive action between broad-leaved and coniferous trees is one not of kind, but simply of degree; and is, as I formerly observed, due to the fact that in winter, when such aid to evaporation is most required, the vital functions of the former class of trees are almost entirely suspended, while the coniferæ keep up a constant circulation of moisture through their tissues.

In a young wood of Scotch Pines (at a later age the trees are less numerous and their cover thinner), under the thick deposit of leaves which forms a natural mulching, the ground will never be found very wet, but always, except under very extreme circumstances, sufficiently moist to ensure the well-being of the plantation. I do not say there would be enough for anything else one might choose to plant along with or under the Scotch Pine, for the latter takes for itself all the nourishment it can get in the soil, and is, in the struggle for life, 'exclusive and intolerant.'

It is also said of coniferæ that their leaves, from their needle-like form, have a special power of attracting electricity, and of absorbing, by the aid of its influence, the ammoniacal gases in the atmosphere.

As for the hygrometric action of grasses, heather, and other weeds, in my Colonial and Continental experience I have found them all—with the exception, perhaps, of some lichens—to dry up the soil in hot weather, though they might keep it wet in rainy seasons. They retain moisture, but what they do absorb they use for their own benefit; they intercept the dew before it can fall to the ground; and their roots, binding and matting the soil, prevent the penetration of moisture and the circulation of air below the surface.

On the other hand, they may sometimes be of service by shading the collar and the tender stem of the young plant from the glare of the sun and in hiding it from the notice of the hare and the rabbit, so often fatal to its young life, and especially by preventing wash on bare and exposed hill-sides. On the steep slopes of the Alps, with a view to extinguishing destructive torrents, or to mitigating their ravages, wherever planting is not yet practicable attempts are made to clothe the soil with grass, as a second best, or as a provisional resource.

It strikes me, therefore, as being impossible to lay down an absolute and universal rule as to the advisability of partial or complete paring of the soil before planting. The forester must, I believe, be guided in this matter, as in most others connected with his art, by the circumstances he has to deal with: by his climate; by the nature and the exposure of his land; by the species of tree he plants, more or less hardy, and by the size of plant he uses; by the cost of labour, the difficulty of obtaining it, &c., &c. In sylviculture, as in every other art, though principles are fixed, their practical application is ever-varying.

DAVID CANNON.

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A PINE TREE was lately cut near Frederickville, which was nearly 6 ft. in diameter at the stump. It was cut into five logs, three 12 and two 16 ft. long, and contained 8,216 ft. of stuff, so good that it was estimated to be worth 30 dols. a thousand. The total value of the tree, at this rate, was 246.48 dols.

EFFECTS OF A GALE.—In the recent gales 200,000 trees were blown down within ten miles of Ayr, on the Countess of Stair's estate, 100,000 on the Marquess of Ailsa's estate at Mochran Hill, and 205,000 at Culgean.

MAHOGANY.—The value of mahogany for ship-building may be calculated from the fact that a Spanish line-of-battle ship, built at Havana, of the finest picked timber, when captured by the English and broken up, more than 100 years after she had been launched, was found to have every timber sound.

ROSEWOOD.—There are several species of rosewood, and the botanists have not entirely conquered this branch of their study. Not every one knows why the name 'rosewood' was applied to the dark wood so highly prized for various purposes. When first cut the fresh wood of the tree gives out a fragrance that is strong and agreeable, much resembling the odour of roses.

COB FILBERTS.

MR. Cooper, F.R.H.S., proprietor of the Calcot Gardens, Reading, has sent us an interesting paper, written by his predecessor the late Mr. Webb, on the cultivation of cob filberts, together with a history of proceedings adopted at the Calcot Gardens for the growth of filberts. We shall give this paper *in extenso*. Though written some time since, it is not the less interesting :—

'In consequence of the extraordinary demand for, and high price of cob filberts, I was induced to call the attention of the fruit-growing public to them, and as I had for some few years been a grower of them in a small way, and found the demand for them increasing, and the price rising, consequently, in 1855, I planted all the ground I had (viz., 10 acres) with them, and they are now all in a bearing state. For the benefit of those who choose to entertain the idea of planting a quantity, I will state the manner I have adopted in planting mine :—I put my trees in squares eight feet three inches apart, and therefore it took 640 trees to plant an acre. As my trees were getting to a good size, I planted potatoes between them, and had a good crop on the same ground for seven following years, and only manured them once since the first planting. Over these I have Apple, Pear, and Plum trees, all in bearing order. Now, with regard to the nuts and their produce :—If the 640 trees bear 1s. each, it is £32 per acre per annum, and if they should bear 10s. each tree, it would be the almost fabulous sum of £320 per acre, and it is not too much to suppose they will yield even more than that, for as a proof of it *I had six individuals a quarter of a day gathering the nuts off one tree, and they were all witnesses to the weight—* 110 *lbs. of cob nuts ;* and then look at the price obtained at the market—they are always saleable—and sure bearers six years out of seven ; and I am of opinion that no crop can be planted which will yield so much money per acre. Let any man purchase twenty acres of land (for it should be freehold) at £100 per acre, and plant it with cob filberts : in seven years it will be worth £1,000 a year to rent —to purchase, ten times the cost. So certain am I of the correctness of this statement, that I have planted all the ground I have. Another thing is that these trees will grow on every soil, so that much of the waste land about Chobham and its neighbourhood would be a very profitable investment to purchase and plant. Some people are afraid of the *great expense*, but look at the *returns*— more than cent. per cent. ; and then it is not a thing of a day, but its value goes on to increase and is never exhausted. If in America an enterprising individual should get the grant of 1,000 acres of land, and at once clear it and plant it with cob filberts, he would find it one of the most remunerative transactions of his life,—their transit to this market is so easy, and as they do not injure from being two or three months in tubs, they could be sent as well as flour or anything else. Wales again:—the quantity of waste land there might be turned to good account if planted; also Ireland and Scotland, in many parts, would be well adapted for them, only people are afraid to try; but pay it must, and wonderfully too. The only drawback is the time you have to wait for the return, but even this is more than compensated for by what you grow on the land for the five or six years you have to wait, so that no time is lost. I say again, no investment can prove half so remunerative on almost every soil. It may be objected that nuts are not *food for the people*, but I hold that every ton of nuts consumed (although it may be called a luxury) is a saving of a ton or more of other food, and one of the most wholesome fruits produced in England. There are also other *paying* properties connected with a nut plantation, beside what is above stated, independently of the beauty of the crop as it hangs on the trees. I shall be very happy to show my plantation to any one who may wish to see it, and also to give any information I may possess on the subject. Of course the land should be *once* dug every year, for the first seven years, and kept clean by hoeing, which will increase the fruitfulness of the plants as well as their growth. These are only a few of the benefits to be derived from planting cob filberts on a large scale. *Compared with land for building purposes, it will yield ten times the profit*, without any expense after the first few years, and then but trifling. I hope at some future time to give a more detailed account as to what is actually produced per acre on my own ground, but I would recommend all who may read this account, that the best plan is to begin and plant *at once*, whether on little or much land, as the returns will the sooner come into operation. To get the right sort, ask for Webb's Prize Cob Filbert trees, to be had only of the grower—the best time for planting being from October to the last week in April.'

In fulfilment of the promise given in the preceding paper to give further particulars of his produce of filberts, Mr. Webb wrote as follows:—

'As I promised in the preceding letter to give a more detailed account as to the produce of an acre, I shall now endeavour to fulfil my promise. First, then, I will begin with the cob filberts, which are the foundation of the produce, and here I can truly say that the land on which they were planted has proved a very profitable speculation, and to prove the fact I will now state what has grown on parts of this plantation, which will be quite sufficient for our present inquiry. Early in September we commenced gathering, and from half an acre of ground we had 1,300 lbs. of cob filberts, and also upon another three-quarters of an acre 1,700 lbs., besides apples, pears, and potatoes, above and beneath. Now it must be remembered that the past season has been by no means an abundant one for nuts, but as it is we will now see the value of the produce, first upon the half acre where we began, viz.:—

	£	s.	d.
1,300 lbs. cob filberts, sold at £7 per 100 lbs.	£91	0	0
40 bushels apples	20	0	0
Potatoes	7	10	0
	£118	10	0

'Now this will be, according to this calculation, £237 per acre. Again, the 1,700 lbs. on three-quarters of an acre, cob filberts *actually sold* at £7 per 100 lbs., and some at £7 10s. will be, if we calculate them at

	£	s.	d.
£7 per 100 lbs.	£119	0	0
50 bushels apples ... ... 20 „ pears	35	0	0
Potatoes	5	0	0
	£159	0	0
Add one quarter more for the remaining quarter of an acre...	39	15	0
Return per acre	£198	15	0

'I think, therefore, after nine years' experience, I am fully justified in anticipating what I have stated, that from £200 to £300 per acre may be *easily* accomplished in growing cob filberts and other nuts of best quality.

'I have now left off digging between the trees for potatoes, and plant them on the top of the ground and draw the mould over them with a hoe; after being planted ten following years, I think my cob filberts will pay quite sufficient without, as the trees getting close together they will be injurious to each other. Now this is not a solitary plantation that no one can see, for we have quantities of visitors, and I may say from all parts of England, Scotland, and Wales, who can testify in some measure to the grand produce of my wood of fruit.'

Mr. Cooper states that, having received letters from different parts of the country asking for fuller information respecting the cultivation of filberts, it has occurred to him that some additional information to that contained in the late Mr. Webb's pamphlet may be found useful to those desirous of growing this much esteemed fruit. For this purpose, the plan adopted at Calcot is set forth; also that adopted by the growers in Kent, and the management described by Loudon in his *Suburban Horticulturist*, so that the reader will get an enlarged view of the subject, and use the information to suit his plantation.

Subjoined are Mr. Cooper's remarks:—

'The word filbert is a corruption of the words "full beards," or nuts with full beards, to distinguish them from the common nut, and hence became corrupted to fillbeard and filberd, and finally to filbert.

'In the natural system, the tree belongs to *Amentaceæ*, which includes all plants which have their male flowers arranged in aments, or what are commonly called catkins, which are very conspicuous on this tree during winter. The female flowers appear at the extremities of buds, are very small, and of a bright purple colour.

'The common nut is a native of Britain and of all the temperate parts of Europe and Asia; it is also common in North America. It is, however, almost as different from the cultivated filbert as the wild apple is from the cultivated one.

'The oil expressed from the common nut is little inferior to oil of almonds. It has drying properties and is used by the painters, as also by chemists as a basis with which to mix expensive fragrant oils, and it has been employed medicinally in coughs. The charcoal made of the wood is used by painters in drawing.

'Filberts are much more easily digested than the common nuts of our woods, and indeed are very useful in relieving attacks of indigestion and headache. They should, however, never be eaten with wine or other alcoholic stimulants.

'*Propagation.*—The filbert may be propagated by laying the young wood, or by grafting them upon stocks of the common nut. When done by the latter mode the operation should be performed in February or March, in consequence of the early rising of the sap.

'It is a curious fact that they seldom ever come true when propagated by seed—not one in a hundred as a rule being worth anything, and a great loss of time has to be incurred in waiting for the fruit.

'*Pruning and Training.*—Perhaps there is no tree the pruning and training of which is so little understood. Consult what author you may, it will be difficult to find any definite or indeed rational rules laid down for pruning this tree. Mr. Williamson has, however, given an account of the Maidstone practice, and which is to the following effect:—"The trees are trained with shirt stems, like gooseberry bushes, but with the heads in the shape of a punch bowl, and exceedingly thin of wood; and are pruned with an exact attention to the mode of bearing. This authority advises to plant the trees where they are to remain, to suffer them to grow without restraint for three or four years, and then to cut them down to within a few inches of the ground. They will push five or six strong shoots, which, the second year after cutting down, are to be shortened one-third. Then place a small hoop within the branches, and fasten the shoots to it at equal distances. In the third year a shoot will spring from each bud: these must be suffered to grow till the following autumn, or spring of the fourth year, when they are to be cut off nearly close to the original stem, and the leading shoots of the last year shortened two-thirds. In the fifth year several small shoots will arise from the bases of the side branches which were cut off the preceding year: from these the fruit is to be expected, and the future object of the pruner must be directed to produce an annual supply of these by cutting out all that have borne fruit. The leading shoot is every year to be shortened two-thirds or more, and the whole height of the branches must not be suffered to exceed six feet. Every shoot that is left to produce fruit should also be topped, which prevents the tree from being exhausted in making wood at the end of the branch. Observe, in pruning early in spring, to have a due supply of male blossoms, and to eradicate all suckers."

'The above-mentioned plan is altogether different to that adopted by the late Mr. Webb in these far-famed Calcot Gardens, for he preferred leaving them to their natural growth. This is an excellent plan where they are planted in rows on each side of a walk, to form a shady sheltered walk in summer. Grown thus they will bear plentifully in an agreeable manner. But where it is intended to make a plantation of several acres, or even of one acre, the young shoots should be shortened to at least half their length, and cutting away or shortening the laterals every year. The management of these is of great consequence. Where the laterals are short, say under six inches, they need not be cut back, the great object being to have the branches thickly beset with fruitful spurs. It is desirable to have a clear stem of at least from twelve to eighteen inches above the ground before the head is formed, and this must be kept free from shoots as well as suckers from the root. The centre of every tree should be kept open and free of branches so as to admit all the sunshine and air possible.

'Mr. Loudon says, the plants should be trimmed to a single stem, from a foot or two in height, and then permitted to branch into a symmetrical head, rather open in the middle, and not greater in height than a man can conveniently reach from the ground to perform the necessary operations of pruning and gathering.

'The fruit is produced from the preceding year's wood, and in unpruned trees is always most abundant at the extremities of the branches, where the leaves of the preceding year have had abundance of light and air. Hence the importance of pruning so as to keep the bush open in the centre.

'The spring, at the time when the male blossoms (catkins) are shedding their pollen, is the best time for pruning, as by the shaking of the tree the pollen is diffused. The young shoots should be shortened to half their length, cutting to a female blossom, and removing all side suckers. The nut weavil lays its eggs in the fruit in June, where it is hatched and escapes in August. The remedy is to remove the nuts that have been perforated by it and destroy them.

Soil.—The filbert will grow in almost any soil. It is grown here on a stiff clay and on a sandy soil. It also does well with peat and sand, and will thrive in a light soil with a dry bottom of either chalk or gravel. *Produce.*—The filbert, like all other fruit trees grown out of doors, cannot always be depended upon for a large crop, the early spring frost often nipping and destroying the blossom. It is, however, a satisfaction to the grower to know that when the yield is small the price is high in proportion.

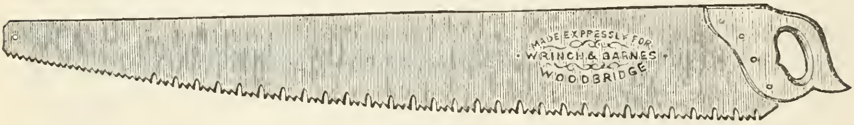
'On ten acres of ground occupied partly with house, out-buildings, and a very considerable quantity of Apple, Pear, Plum, and other fruit trees, eight tons of nuts have been grown at Calcot in one season.

'*Varieties.*—The following is a list of the sorts grown here:—No. 1. WEBB'S PRIZE COB FILBERT. This is an improvement upon the common round cob nut. The husk is hairy and longer than the nut; the shell is of a dark brown colour and thick, with large sweet kernel. The nut is large and obtusely ovate. This is one of the very best nuts to grow: it is very hardy, will do on almost any soil, and is an excellent cropper. No. 2. EMPEROR COB. A seedling of Mr. Webb's raising and a very superior nut, in many respects resembling No. 1. No. 3. IMPROVED COSFORD COB. The husk of this variety is as long as the nut; the shell is soft and thin, so much so as to be easily broken between thumb and finger; the kernel large and of an excellent flavour. The tree is an abundant bearer. No. 4. NEW COB DAVIANA. A larger variety than No. 3, and a deliciously flavoured nut. No. 5. PROLIFIC CLOSE HUD FILBERT. The husk well encloses the nut, which is of medium size and short, with a full and well-flavoured kernel. No. 6. RED SKINNED FILBERT. This variety is very distinct from all others, the kernel being covered with a skin of crimson red colour; it is superior in flavour to the white variety, but is less prolific; it does best in a light loamy soil, but does not require manure. No. 7. WHITE SKINNED FILBERT. A more abundant and a more generally cultivated sort than No. 6. This is the sort cultivated in Kent. The husks of both are close fitting to the shell, and so contracted towards the apex of the nut as to prevent its falling out. No. 8. EUGENIE. One of Mr. Webb's seedlings. The husk is rather smooth and about covers the nut, which is of medium size, with a rather soft shell, and good flavoured kernel. No. 9. THE MARQUIS OF LORNE. The husk fully covers the nut, with an inclination to open; shell light brown, medium thickness; kernel full and very rich flavoured, and an abundant bearer. No. 10. PRINCESS ROYAL. This is a new filbert, one of Mr. Webb's raising. The husk projects beyond the nut, is long and pointed; shell a rich brown colour and rather soft; kernel full and sweet. No. 11. GARIBALDI. A fine, long, handsome nut, one of Mr. Webb's seedlings. The husk large and imbricated; shell light brown and moderately soft; the kernel full and very sweet. A good bearer and one of the best varieties grown; at present very scarce. No. 12. KENTISH COB. This is perhaps one of the best of nuts. The tree is a most abundant bearer. It is an excellent keeper, and its full rich flavour is increased thereby. The husk, nearly smooth, is longer than the nut, and slightly cut round the margin. The nut is large, being sometimes upwards of an inch in length, oblong and somewhat compressed. The shell thick, of a brown colour; the kernel full and very richly flavoured. No. 13. THE DUKE OF EDINBURGH. A very large heavy nut, with large and imbricated husk, projecting beyond the nut; kernel full and sweet. A splendid nut. No. 14. THE DUCHESS OF EDINBURGH. Very similar to No. 13. No. 15. THE SHAH. Husk small; shell light brown and very hard, indeed one of the very hardest; kernel full, rich, and sweet. No. 16. CANNON BALL. A seedling round and large; a very marked variety, first class quality; excellent bearer, very scarce.'

[Mr. Cooper has courteously sent us some specimens of his Cob Filberts, and it is our opinion that they are certainly very fine trees, healthy, well-rooted, and with splendid branches. We confess that we have read through the description of his system with unusual interest, and we commend the experiment of Filbert planting to all who may be enticed by the preceding narrative to launch into what is clearly a most remunerative undertaking.]

A ONE-MAN CROSS-CUT SAW.

BEFORE writing to express an opinion on a cross-cut saw sent to us by Messrs. Wrinch and Barnes, of Woodbridge, we were anxious to have its merits tested in every possible way. In order, therefore to give it a thorough trial, it has been handed in succession to the foreman in an estate timber-yard, who is daily cross-cutting blackrinds, oak timber, and logs of all kinds, preparatory to putting them on the saw-bench; to the woodreeve, who, owing to the heavy gales has unfortunately had more than an average amount of cross-cutting on his hands lately; and to the bailiffs upon the home farm. Thus it has had a fair trial upon seasoned timber, upon green logs, and upon fallen branches of the largest size. The verdict of every man into whose hands it has been placed is that it will prove a great boon to-every one similarly engaged. No tree whose diameter is not too great to afford the saw full play proves too much for it. It is not too much to say that the otherwise laborious operation of cross-cutting is by the aid of Messrs. Wrinch & Barnes's one-man saw made easy and pleasurable. Instead of sending two men, or one man and a stout lad, as formerly, to clear the highways after a high wind, the same amount of work can now be done by one pair of hands. It will be of the greatest possible use in trimming up fallen trees, and effect a great saving of time and of material when compared with the axe. In the wood-yard of a mansion or country house it will prove invaluable.



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Admiralty Contracts for Timber.—The following names of firms whose tenders were accepted at recent contracts for supplying the Admiralty with English and foreign timber, &c., are given by the *Timber Trades Journal.* Lignumvitæ, Messrs. Irvin and Sellers; mahogany, Messrs. Hoar and Brown; English elm timber, Messrs. R. and T. Groom and Son and W. Densham; Riga hand masts, Messrs. Foy, Morgan, and Co.; Danzig goods, Messrs. P. J. Albrecht and Co.; Canada goods, Messrs. R. R. Dobell and Co.; American pitch pine timber, Messrs. Wm. Crundall, R. and R. Bayly, and T. Bailey; ash, beech, hornbeam, &c., Messrs. James Bowerman, H. Naylor, and East and Son; oak boat crooks, Mulford Bros.; staves, Morgan, Gellibrand, and Co., and H. and R. Fowler.

Timber Tender.—The tender of Messrs. Cunnington Brothers, of Norwich, for the supply of oak, elm, and beech timber to the Yarmouth Port and Haven Commissioners, during one year, was accepted last month.

LARGE TREE AT DARNAWAY.

I AM sorry to have to state that the large Spanish Chestnut tree in the forest here (Darnaway, N.B.), and which is noticed in the report of the Scottish Arboricultural Society's excursion to the place in 1881, became a victim to the storm of the 27th January last. I do not think it was blown down, its position being well sheltered from the wind which then prevailed; but rather that it had given way under the weight of soft snow which had accumulated in its limbs and branches. It had a large top which leaned heavily to one side, and its root-hold, for a tree of its size, was remarkably slight, and this leads me to believe it collapsed from the cause I have indicated. In the report referred to, it was estimated to contain 400 cubic feet. I measured it a few days ago. Measuring the limbs up to nine inches in diameter, I found it to contain, including bark, 525 cubic feet, besides several tons of branches of smaller dimensions.

In 1881 the bole contained 208 feet. It now contains 214 feet while in one of the main limbs and its connections there were upwards of 120 feet. I am at present unable to state its age, but evidently it has been of remarkably fast growth. Having yet got no saw long enough to cut off its root, I cannot with certainty give its greatest diameter, but it will be close on, if not quite six and a half feet. If I am at any time able to ascertain the age, I will report it. I do not think, however, it will exceed 150 years.

D. SCOTT.

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CATALOGUES.—We have to acknowledge the receipt of the following :—Messrs. F. W. and H. Stansfield, nurserymen, of Sale, near Manchester and Pontefract, Yorkshire, send us their select list of British hardy and greenhouse Ferns. It is illustrated by some choice varieties of our beautiful flowerless plants and intermingled with the particulars of price are some useful descriptive notes. From the same locality (Sale) we have the list of Messrs. W. A. J. Birkenhead, and an abridged catalogue of Ferns and Selaginellas, and another a 'special offer' list of the same kinds of plants. The reputations of both these firms are wide ones. We have also received Messrs. R. and A. Morrison's (Pinefield Nurseries, Elgin), list of forest and ornamental trees.

ENGLAND.

THIS the first month of the agricultural spring is characterised by storms and strong gales of great fickleness and uncertainty. These boisterous winds, absurdly denominated equinoctial gales, frequently occur about the end of the third week in this month. Sometimes the month is heralded by fierce storms often accompanied by snow; but mostly the winds blow from the north-east, and are keen, dry, and powerfully evaporating. Should they blow from the opposite quarter, we may expect moist weather, unfavourable to agricultural operations. The average rainfall is about 1·33 in. Last year, the record for this month at Greenwich was little over three-fourths of an inch; nearly half an inch below the average of the ten years 1871-80; while the quantity registered at Chewton-on-Mendip was 1·56 in. The evaporation during the month is about equal to the average rainfall.

Orchard.—Finish the planting of fruit trees as early in the month as possible; and any pruning yet undone should now be confined to the cutting of small branches and shoots. Where grafting is essential, begin with Plums, then Cherries and Pears, finishing with Apples.

Fences.—All hedge planting should be finished this month if possible: the month following is mostly too late, and generally unfavourable for Thorn planting. Protect the newly-planted hedge by a fence of some sort. Wires on wood posts are as economical as anything that may be used, as the wire can be removed when the hedge is strong enough to stand alone, and may be used again in the construction of other fences. Complete the laying of old hedges as early as possible; and finish digging and cleaning young hedges.

Planting in the forest should be brought to a close this month before the plants begin to open their buds; afterwards planting is seldom successful, and never truly satisfactory. Boggy lands that may have been judiciously left unplanted until now, should be planted up as speedily as possible to ensure success.

THINNING.—Plantation thinning should be completed by this time. With the advancing spring trees become much more sensitive to the sudden effects of the increased circulation of cool air amongst them; their susceptibility to injury from this cause is often markedly apparent amongst young Oaks, by the production of epicormic branches, where the thinning has been delayed for the purpose of stripping the bark. These epicormic branches should be annually dressed off, until they cease to grow at all. If allowed to develop themselves unrestrained, they often lead to premature maturity, and materially deteriorate the quality of the timber of the matured tree.

NURSERY.—This is a time of diligent activity in the nursery, in clearing out the plants for the forest, and refilling up the plots by transplanting seedlings, or preparing the ground for other crops. Exhausted ground should receive a good dressing from the compost heap or of well-rotted dung. Plant into nursery rows stocks for grafting ornamental trees of various desirable species and varieties. Root-prune large trees intended for transplanting in the autumn. Sow seeds of the Alder, Birch, Elm, Laburnum, Sycamore, and other deciduous trees, and graft the several kinds of ornamental trees propagated by this method. Digging between the nursery lines will encourage the growth of fibrous roots, and save some after labour in keeping the ground clean.

A. PATERSON.

Hunstrete, Pensford, Bristol.

SCOTLAND.

SINCE communications were sent you for your last issue, we have, with the exception of about a week, experienced open but generally rough weather. A series of gales varying in force has passed over the country. For a week previous to the 27th of January the wind blew stormy and gusty, and in exposed places numbers of trees were blown down. On that date, however, or rather on the night previous, a storm of wind, accompanied by a blinding snow-drift, set in and continued with almost unabated fury for nearly twenty-four hours. It has been characterised as being in some localities of unexampled severity. As almost a natural consequence of this extraordinary depression, damage to an unparalleled extent is reported from various districts of the country. Here, and in the northern counties generally, so far as I can learn, the damage to forests is inconsiderable, or at least, much less than expected, and by no means to be compared to what has been experienced from storms yet fresh in the memory of not a few. In the south-western counties, however, there is a different tale to tell. The destruction to woodland property is said to be immense. On the estate of Culzean, in Ayrshire, the value of the timber blown down or uprooted is reported as being about £20,000, and in other places results more or less disastrous are reported. Here we have lost one of our largest trees, to which reference is made in another place.

The storm referred to will doubtless have given many a great deal of work not desired nor expected. Planting, however, with the favour able season we have hitherto had, will be in a forward condition, so that extra work can better be undertaken. The planting of deciduous trees which have yet to be removed should now be speedily accomplished. With a continuance of mild weather the buds will very soon begin to swell, and it is very desirable to finish transplanting before that occurs. While planting of evergreens may be with care generally continued all this and most of next month, it is no doubt better to now complete all forest planting operations as soon as possible. Plantations formed in the earlier part of the season should be looked to, and all plants knocked about by the recent gales secured.

As the nursery becomes vacant prepare for re-cropping. Top-dress, or green crop and manure plots partially exhausted. Transplant and lay seedlings. Complete the sowing of seeds, except those of the coniferous family, and forward general work as the weather is favourable.

Complete the felling of hardwoods as soon as possible, and continue where necessary the thinning of coniferous plantations.

Prune and dress-up shrubberies, and towards the end of the month dress evergreen hedges and box edgings, removing and burning the prunings as the work proceeds.

D. SCOTT.

Darnaway, N.B.

IRELAND.

AFTER a month of unprecedented propitious weather, February was ushered in excessively stormy, and all throughout was a succession of storms with heavy rainfalls. Much valuable timber is blown down all over the country. The forester will have his hands full for some time to come cutting up the fallen trees and getting the plantations cleared.

Planting operations ought now to be advanced with vigour, so as to be completed as soon as possible. During the harsh dry winds usual in March every care should be taken to prevent the roots being injured. When transplanting large plants puddle about the roots liberally, especially if the weather be dry. This is very important to success, and should never be neglected.

Thorn and other live fences should be planted, if at all, early in the month. These are too often left unplanted until late in spring, with the result a weakly, sick-looking growth and very unsatisfactory appearance. All gaps should be made good by splashing down shoots from either side, or by inserting new plants. It is wearing late in the season for much splashing now, but if attended to early may still be done.

Continue cutting and clearing away underwood, but finish before the end of the month. Finish falling hardwood trees early; but Conifer may be cut for some time.

Towards the end of the month commence pruning young coppice. The shorts should be thinned out and trimmed well up, with straggling shorts removed.

Finish all planting in the nursery, and get the ground dressed up in a workmanlike manner. Sow in beds, but not broadcast, Thorn, Beech, Holly, Birch, Ash, Sycamore, and similar seeds, in ground previously well prepared.

Estate fences of all kinds will need looking after, and, where necessary, repaired, to prevent trespass from live-stock, coming on the spring. Grass in plantations being somewhat fresh at this season it forms a great temptation to stock to break through and steal.

Tipperary. D. SYM SCOTT.

WALES.

WHEREVER the planting of forest-trees has not been finished, no time should be lost in bringing such work to a close during the present month. Beat up young plantations where plants of recent planting have failed or been otherwise destroyed. Plants of moderate size may be used for such work, as they will have the benefit of their previously planted neighbours to shelter them. When such plants are used it will help to maintain the uniformity of the plantation. Attend to recently-planted trees, and see that they are kept in an upright position. Owing to the late gales trees of large size that have been recently transplanted will be likely to have suffered, and likely to require their stakes or moorings adjusted.

The cutting of underwood and the thinning of hardwood plantations will in most cases have been finished, but where other work has intervened to cause delay the sooner it is finished the better. Continue the thinning of young plantations and coniferous trees, and remove the thinnings as the work proceeds. Bind up faggots, and prepare firewood as recommended last month.

Clean and tidy-up in pleasure-grounds, and roll walks and grass lawns. Continue the filling-up of empty ground in the nursery, and dig or fork between the rows of plants that have not been transplanted this year.

Kinmel Park. Lewis Bayne.

* * *

RECENT SALES OF ENGLISH TIMBER.

[From the *Timber Trades Journal.*]

Bucks.—Messrs. Hart, auctioneers, held a sale of timber, on the 13th February, consisting of ash and elm timber, hardwood, and fagots, grown on the Mentmore Estates, Bucks. The prices fetched were :—Elm 4d. to 6d. per foot, ash 1s. 6d. to 2s. 6d. The principal purchasers were Messrs. Rowland Brothers, Fenny Stratford ; A. and D. Stevens, Tebworth ; W. King, Linslade ; G. Heley, Winslow ; Montague, Cheddington ; J. East, Berkhampstead.

Cornwall.—A sale of timber was held on the 25th January, at Callington, when some 420 oak, 150 ash, 113 sycamore, and a quantity of lime, elm, beech, chestnut, fir, and other trees, grown on the Whiteford Estate, the property of the Duchy of Cornwall, were offered by Mr. W. J. May, auctioneer, Liskeard. The total sum realised by the sale was £852 12s. 6d., the attendance and competition being very satisfactory. The chief buyers were Messrs. Osborne, Stevens, and Co., of Uxbridge ; J. Wiles, of Bethnal Green ; Hambly and Wotton, of Plymouth, &c. The whole was divided into about seventy-two lots, the highest price being obtained for lot 59, nine oak trees, £38 10s.

A sale of timber was held on the 12th February, at Liskeard, consisting of oak, ash, elm, Spanish chestnut, &c., grown in the Coldrenick Woods. Mr. Spry was the auctioneer, and the sale was brisk, except for elm, some of which was considered defective. The principal buyers were Messrs. Disham, of Exeter; Best, of Bodmin ; Thorning, of Devonport ; Higmen, St. Ives, &c.

South Wales.—A sale of oak, sycamore, lime, and beech timber trees, grown on the Boultibrooke Estate, was held at Presteign, Radnorshire, on the 8th February, Mr. E. Stooke, of Hereford, being the auctioneer. The timber was divided into five lots, and was disposed of at the following prices :—Lot 1, 100 oak trees and 75 oak poles sold to Mr. W. Minshall, of Northwich, for £180 ; lot 2, 31 sycamore, Mr. Thomas Crompton, of Pendlebury, £110 ; lots 3 and 5, 25 oak and 22 lime, Mr. R. Williams, Hay, £195 ; and lot 4, 36 beech, R. Barlow and Sons, Wilmslow, £90.

Suffolk.—Messrs. Flick and Son, auctioneers, held a sale of timber on the 15th February, grown on the Church Farm, Chillesford, Suffolk. The sale was well attended, good all-round prices being realised, the competition for ash stands being especially keen. The buyers included Messrs. Woods and Son, Brandon ; Watting and Son, Woodbridge ; Wrinch and Son, Ipswich ; Keen, Waterloo Road, S.E. ; Dunningham, Harwich ; John Sewell, Butley ; and John Martin, Oxford. The total proceeds amounted to £288 7s. 6d.

Worcestershire.—Mr. George H. Winton, auctioneer, offered for sale, on January 29th, at Tenbury, some very choice oak, ash, and other timber, standing on the Kyre Park Estate. A large company attended the sale, and the lots were quickly disposed of, realising very fair values. The buyers were Messrs. R. Barlow and Sons, Wilmslow, Cheshire ; Messrs. R. and T. Groom and Sons, Wellington, Salop ; Mr. W. J. Clayton, Birmingham ; and Mr. C. Hinksman, Tenbury.

PLANTING TREES.

SIR,—Referring to the correspondence on this subject, I cannot help thinking that 'Loanleah' and 'Bannockburn' have quite misunderstood Mr. Scott (November issue, p. 67). Having some experience in planting in various soils and situations, including grassy land, I found it quite impossible to get up a crop in the latter without paring.

In 1872, a proprietor in the county of Aberdeen asked my opinion as to a large tract of grassy land which he had planted many years before, and had filled up every year since, but without any result. He stated that up to about the present time (1872) about 20,000 plants per acre had been employed to form what was then a straggling plantation. I gave it as my opinion that the surface should have been pared, as in many places the plants died the first year from want of *sufficient moisture,* and from the notches opening through the grass roots being so matted. I got instructions to have it planted by the process recommended, viz., paring. I proceeded to work, and put 3,000 plants per acre with the result that these produced a fine crop, overtook those planted many years previous, and in every way satisfied the owner. Without paring, this would never have been the case. I therefore hold that your correspondent 'Tamas' is perfectly right in saying that more plants die from want of moisture than from choking.

Any person who has had to plant such land knows very well that, except in the autumn and winter months, little or no moisture is found in many places underneath the roots of the grass. This does not apply to land which has been recently under crop, but waste lands which have a tendency to produce grass, and land that has been long pastured.

In practice I found that when the grassy turf was pared off, the roots of the plants were better protected, and in making the notch the soil was made friable, and the plant had not to be put so deep; neither did the plant suffer so readily by being blown about, as when notched in the grassy turf. Where the soil is 'of a thin, rocky, uncultivatable character,' there is generally very little grass, and consequently no paring is required.

I can hardly think that 'Bannockburn' is serious when he says that notches will open with frost on account of the soil being rendered 'loose and friable,'—the very condition desired, and a condition on which frost has no effect in the way of cracking or opening. In fact, frosts make friable soils more friable, and therefore less liable to open with its action. On the other hand, to pare heathy soils would be wrong, because heathy soils are generally of a fine, compact character, and if the immediate thin covering of moss at the roots of the heath was removed, the result would be disastrous: in that case the notches would open and expose the roots of the plant, no matter how well planted, and on this soil frost acts powerfully, as also very dry weather. Burning narrow strips is the proper mode of working such covert, but to burn grass lands a few years before planting is too ridiculous to notice.

I also think Mr. Scott is quite right as to the way in which to lay off roads; but, so far as I can understand, Mr. Scott does *not* say *not to* plant the road after it is formed: he only says to *form* the road 'during times when planting cannot be done,' and I take it that when formed, you can plant or not, as you please. All roads should be marked off, levelled and drained, and bridged, or 'eyed,' where necessary. It is quite impossible to form roads after the woods are up, even at the first thinning. The result would be followed by disaster, and the line much more difficult to form.

Mr. Scott does not mean to make the road right off, at a cost of £100 or £200 per mile; he simply says *formed*. Nothing could be plainer than that; and what Mr. Scott proposes would not cost over £20 per mile under ordinary circumstances. In my opinion it would take nearly that sum to make pits and transplant all the plants that would grow on a mile of road 15 feet wide, and the road would still be to form, so that 'Loanleah' is a little shortsighted.

I think, however, that it is quite unfair to criticise the articles 'Forestry for the Month,' as it is quite impossible to give more than the text of the subject. Such criticism must injure 'FORESTRY' unless it is done by practical and tried men, giving their name and address. D. F. MACKENZIE.

Morton Hall, Edinburgh.

Sir,—I have now had the advantage of reading in the last number of 'Forestry' Mr. Scott's reply to 'Loanleah,' in reference to paring the surface of grassy land before inserting the plants, and as presumably he is one of the ablest advocates and exponents of this method of planting, I conclude that we are now in full possession of its merits. No one will dispute the 'practicability' of paring, provided the initial cost of planting is not considered; but to the necessity or utility of it I entirely demur, and it is an unwarrantable assertion to say that the necessity of paring is now very generally admitted by practical men. I can confidently assert that nothing like a moiety of the foresters in Great Britain admit the necessity or practise this method of planting. This innovation is chiefly confined to a few foresters in the north of Scotland, and without entering the regions of prophecy, I may safely affirm that the practice will never become general. I have tested this method of planting on a variety of soils and situations, and the invariable result was a large percentage of deaths, especially on exposed situations and high altitudes, and in my opinion, and from my experience, it is not only an unnecessary, but a pernicious practice. Heat and moisture are essential to the healthy growth of plants, as every forester will admit, but which the advocates of paring seem to ignore, and to pare off the surface before inserting the trees is to expose them unnecessarily to cold and drought at a time when they stand most in need of shelter and protection.

I do not think it can be seriously maintained that any herbage—with the exception of bracken—growing at an elevation of from 500 to 1,000 feet can appreciably prevent a free circulation of air or prejudicially affect newly-planted trees. On the contrary, I have always found any grassy vegetation most beneficial in protecting the roots of newly planted trees from the cold and drying winds which we almost invariably experience in the spring months, and likewise in preventing evaporation.

I have, therefore, arrived at the conclusion that the cure of paring the surface before inserting the plants is emphatically worse than the disease, and it is unbecoming of the advocates of paring to accuse the grass of depriving the plants of nourishment when they are greater offenders in this respect themselves.

This subject is now tolerably well thrashed out, and I leave it to the judgment of the readers of 'Forestry': they can form their own opinions on which side the preponderance of reason and argument lies.

Bannockburn.

Sir,—By way of reply to 'Bannockburn's' letter, which appeared in your last issue, permit me to say that, some years ago during, the time of a severe drought, I had occasion to be on that portion of the famed Culbin Sands which belongs to the estate of Moy, and was surprised to find the annual growths of Scotch Fir plants to be from twelve to eighteen inches, and that on elevations of two to three hundred feet of pure sand, the only protection being pieces of brush here and there to keep the sand from drifting. On inspecting an unprotected place on the face of one of these hills, I found that moisture was within three-quarters of an inch of the surface. On the same day I found the drought had penetrated fully three inches in a fertile grass field.

At one time I was somewhat of 'Bannockburn's' opinion, and had a small patch of about forty acres planted with Scotch Fir, the grassy portion of which turned out a complete failure. I chanced to be on this place the day after a rain of seven hours' duration, and found that half an inch below the surface the earth was dry as ashes, whereas, among heather and bare ground, it had gone down from two to three inches.

There are two simple reasons why moisture should be deficient under a strong grassy surface: 1, very little rain gets down; 2, what does get down is quickly absorbed by the numerous grass roots. Should my practical theory not be sufficient for your respected correspondent, I trust he will imitate the great hero of 'Bannockburn' by returning to the charge. TAMAS.

Stanedike, Feb. 14, 1884.

SIR,—When penning my last communication to you on this subject I did not contemplate returning to it. 'Bannockburn,' however, thinks my recommendations on turf paring, for notch planting, *where a close grassy vegetation exists*, so 'thoroughly wrong,' and, moreover, the reasons he adduces in support of his opinion are, in my opinion, so contrary to fact, that I venture to again trouble you with a short note.

'Bannockburn' states in support of his opinion, 'that the greater part of the land devoted to planting in this country is of a thin unculturable character, and that 'if you pare off the surface there is nothing left to hold the plant.' Well, I would ask him, is the vegetation in these places such as I refer to? Certainly not! Instead of a close grassy vegetation, he will invariably find short heather, or a moss-covered surface, and if there is any grass at all, it is generally, if not always, so thin and stunted that none of the evils to which I have already referred arise from its presence. Paring is therefore on such lands unnecessary if not prejudicial. But I would ask your correspondent, is there not considerable portions of the lands planted on which there is a considerable depth of soil, and on which close rank grasses vegetate ? If so, then, when pitting is not resorted to I recommend paring; and without either, satisfactory results on such lands will not follow. That, at least, is my experience, and I know it is also that of others. And further, I recommend paring, or at least a clearing of the spot where there is a thick coating of moss, so that the plants may be properly inserted into the soil without being put out of sight as they would in cases otherwise be.

Very recently I had occasion to pass over a considerable extent of ground, planted a year or two ago, where neither paring nor pitting had been resorted to in such places as I have indicated ; and what is the result ? It is, that, on the parts where the natural herbage is altogether or chiefly grass, a large proportion of the plants are dead ; some do exist, and barely so, with the fallen grasses of the last season or two hanging on and around them, and but for the elevation they cause on the surface many of them could hardly, and some could not at all, be detected ; while amongst the heather and on ground such as 'Bannockburn' himself refers to, the plants are plentiful. What then is the use of planting and allowing the plants to become smothered with the natural vegetation, the worst of which is rank grass ? If paring is properly done when the plants are inserted nothing more is generally required. If not pared, what is to be done ? Resort to 'Loanleah's' cutting, which is dangerous in itself, more expensive, and far less effective than the former ! The cost of paring is not to be compared with the advantages to be derived from it in these situations; and these advantages are in cases, in my opinion, not confined to those I have already referred to. . . . With reference to firming the plants, and the opening of the notches where the surface is pared, my experience is almost entirely contrary to that of 'Bannockburn's'; and as to his strongest objection, viz., 'the plants being killed by drought,' it is also untenable, as where paring is recommended or required there is generally, if not always, sufficient moisture for the growth of the plants.

'Bannockburn' concludes by advising those who contemplate planting such land to take the advice of 'Sylvestris,' and 'burn *it* half-a-dozen years before planting.' But what *it ?* 'Sylvestris,' I think, referred to strong rank heather, but 'Bannockburn' evidently means grass. With the former I can agree, if the heather is too strong to permit of planting being done at reasonable expense (heather, however, was not referred to in the recommendation which has resulted in this correspondence); but with the latter no really practical party could, in my opinion, agree. To burn grass, and plant six years afterwards, when the grass would, in all likelihood, ere the period was half expired, be as rank and luxuriant as before —the proposition is simply preposterous, and a needless waste of precious time, when by pitting or paring, the ground could at once be planted, and six years' growth gained to the bargain.

'Bannockburn' must propound other reasons in support of his opinions, and, I venture to think, they will be difficult to devise.

D. Scott.

Darnaway, N.B.

THE GALE OF SATURDAY, JANUARY 26th, 1884.

Sir,—The effects of the gale which raged with such fury during the evening and the early part of the night of Saturday, the 26th January, were more disastrous than those produced by any storm with which we have been visited for many years previous. Falling trees and flying branches, tiles, slates, and chimney-pots, made locomotion exceedingly dangerous, and only those whom the necessities of the situation called abroad ventured out.

One of the grand old Cedars upon the lawn at Surrenden-Dering was shorn of nearly half its strength, and huge branches were strewn among the shrubs around. In the fine avenue of Limes, Sycamores, and Elms which border the handsome drive leading from the mansion to the village and the parish church of Pluckley, two of the noblest Elms in the front line were uprooted, and many others were snapped off or more or less torn to pieces. The main avenue in 'the Forest,' upon the same estate, was for some days completely blocked by fallen Spruce and Silver Firs of large size; and all over the estate the old timber suffered severely. Thousands of young trees just planted out in the woodlands were loosened and battered about in the wildest possible manner. Fortunately the land was not very wet at the time, otherwise many of the noble trees whose hold upon the ragstone is not of the deepest must have yielded to the fury of the storm. It will be some time before we shall be able to clear away the wreckage. And even then mutilated trees and numerous gaps will remain to show the destructive powers of the wind on that memorable night.

Numerous lengths of park-paling were blown bodily into the adjoining roads, chimney-stacks went down, houses were partially unroofed, glasshouses stripped, and hop-pole-stacks went over by hundreds.

A. J. Burrows.

Sir,—I dare say it may be of interest to some of the readers of 'Forestry' to hear what damage was done here by the late gale. The wind was from the south-west, unaccompanied by snow. It overturned some two hundred Larches and a few Spruces and Oaks situated on the western side of a valley extending north and south, but at a considerable altitude, not under nine hundred feet above sea level.

About a dozen of the Larch were broken off about six feet from the ground; the others were uprooted, carrying several yards of earth with their roots. The soil on which they were standing is dry and loose, with rock and shale here and there appearing.

It is curious to observe that some fifty of these trees were growing on the spot where a previous growth of Larch, some sixty or seventy years old, was overturned by a storm in July, 1853. In that gale—perhaps the most disastrous that has ever occurred to life and property in this county—the whole of this section of this plantation, carrying upwards of one hundred and seventy large trees, was swept down *en masse*, creating thereby such a noise, in addition to that of the raging storm, that the neighbouring cottagers thought the end of the world was at hand.

Castle Madoc, Brecon, February, 1884. H. P. Powel.

RAINFALL IN NORTH WALES.

Sir,—In the event of a change of climacteric influence which would give us a cycle of dry seasons, I very much fear that we should suffer severely from a scarcity of water. The great area which has been drained during the last ten years is beginning to affect the wells in this district even now. Notwithstanding the great excess of rainfall which we have had every summer lately, we find in the month of September in each year the springs fail to a certain extent in many places, and such a summer as we had in 1870 would be a calamity more readily imagined than described. The rainfall, instead of remaining in the soil and gradually sinking into lower strata to supply the springs, is now drawn off by innumerable channels and is carried away into our streams and rivers very quickly. I imagine it will be found necessary by our Government to take the matter up, and form reservoirs amongst the hills in the same manner as the inhabitants of large towns have been compelled to do. During the summer of 1870 I met a large farmer from the south of England who told me he was obliged to drive his stock, consisting of some hundreds of heads, a distance of five miles to water, and by the time they got back they were as thirsty as when they started. The benefit of reservoirs would be twofold, as by holding back storm water they would in some measure prevent that dire calamity—summer floods. If there had been reservoirs constructed amongst the hills above Llandulas, it is hardly likely that the rivulet which swept away the railway viaduct and deluged Abergele—besides doing an immense amount of damage to property in the district—would have gathered force enough to do the mischief which not only caused such destruction, but was a great annoyance and discomfort to thousands of tourists who were seeking health and recreation in North Wales.

W. MAINWARING.

PLANTING IN IRELAND.

SIR,—Dr. Howitz, Forest Conservator, Copenhagen, has made an inspection in the south of Ireland in connection with the subject of reafforesting the country, and in his report gives a list of forest trees to be cultivated, with a few remarks on their habits, utilisation, cultivation, and general character. The trees which will form the first and most important part of the planting in Ireland will, according to Dr. Howitz's opinion, consist of 36 different kinds of coniferæ, 54 kinds of hardwood, and 8 kinds of shrubs. At the end of this terrible list of trees the doctor says 'that a more detailed and professional description of each will be requisite for each district, will be necessary, I am fully aware, IF *experienced* foresters from *abroad* are not to be engaged for this work.' This is a sad stigma on the Scottish Arboricultural Society and their boasted efforts in the interest of training young foresters; and as such I leave it, with the remark that I have yet to learn wherein Continental trained men excel our own British trained foresters.

Turning our attention to Dr. Howitz's report, it appears to me evident that he must have exhausted some nurseryman's catalogue of forest trees to complete such a formidable list as he recommends to be planted. I have no means of knowing whether this letter will fall into the doctor's hands or not; but all the same I have no alternative but to characterise his report as the most reckless thing of the kind it has been my lot to peruse. The British forester is taught the science of forestry, which comprehends and includes historic, economic, sanitary and practical forestry, a training apparently utterly beyond the capabilities of the Copenhagen doctor. Before commencing to plant forest trees we must first consider the demand for any particular timber, and then the site to be planted, to see whether it is at all likely to produce the class of timber possibly most in demand. This the Copenhagen Conservator of Forests omitted, and instead tabulated an imaginary list of trees and shrubs to catch the eye and show his erudition, without considering their timber-producing qualities on a practical £ s. d. principle.

Tipperary. D. SYM SCOTT.

PROTECTING TREES FROM GOATS.

SIR,—As your correspondent 'Tar' appeals to those interested in trees, I venture to give him my experience in the matter.

I found it impossible to protect trees from the ravages of goats by the application of any substance known to me, because they ate every green thing not actually *smeared* with the material. They would stand on their hind legs and reach up to the small branches of nearly all young trees and shrubs requiring protection. Sprinkling with coarse paraffine had the best effect, as it could be applied to the foliage and would spread over the branches and stems, while the quantity of tar or tarry material would kill the plant right off. I found that tar and tarry substances, as well as animal fat, had a detrimental effect on all young plants; they remained sickly and stunted for years, and a high death-rate followed, but if applied to the lower part of the boles of park trees it did not appear to have any detrimental effect.

Six years ago I discontinued the use of tar and applied paraffine with the best of results. I found that no hare or rabbit nor roe deer would touch plants of any description dressed with paraffine. No deaths or unsightly appearance. The use of the paraffine was so satisfactory that I began to use it for dressing *all* seeds with it before sowing. I now dress the wheat with it before sowing, instead of sulphate of copper, and the other substances more or less used for the purpose. No grub, wire-worm, crows or pigeons will touch it, and if used in the gardens and nursery the birds, mice, and slugs will cease to molest. When the braird is attacked by pigeons, &c., a little paraffine sprinkled stops them and every other creature (goats excepted), from eating anything to which it is applied.

Paraffine is an excellent manure, especially when mixed with soot, lime and ashes of any sort: it is preferable to the so-called Peruvian guano, and at one-third the cost of the latter.

So that instead of the application of paraffine being injurious to plant life it is quite harmless, and in most cases a stimulant.

The best preventive for the goat's destructive inclination is to smear the plants with human excrement, but this is highly objectionable and expensive; the only safe plan is to shut them out.

D. F. MACKENZIE.

Merton Hall, Edinburgh.

KAY'S DENDROMETER.

SIR,—It is on record that old King Solomon said, and said truly, 'there is nothing new under the sun,' and from your Indian correspondents it would appear that Mr. Kay's Dendrometer is not only *not a new one*, but a very old one of German invention.

I was about to buy one of these instruments from Mr. Kay's agents, but now I shall wait till it is seen what time will reveal.

At the last annual meeting of the Scottish Arboricultural Society, I happened by mere accident to be in the Royal Botanic Gardens, and had the very pleasing experience of watching a practical test of Mr. Kay's instrument alongside of another instrument of a like nature, exhibited, as I understood, at the same meeting by Mr. Mackenzie, of Edinburgh.

Since then, I had hoped for, and quite expected to have seen, a full and complete description of Mr. Mackenzie's new Dendrometer, for which, I was afterwards informed, he was awarded a first-class silver medal.

From a superficial observation of the trial of Mr. Mackenzie's instrument in the Botanic Gardens that day it appeared to me that it was proved to be all that could be desired by the forester, except the price, which, if I was rightly informed, would in my opinion be rather high; however, I doubt not that even at the high price of £2 2s. it would be cheap comparatively speaking. Mr. Mackenzie showed that not only could the height of any object be ascertained correctly, and that from any position, whether level with, or above, or far beneath the level of the object, but the distance could also be ascertained as correctly as the height; this being an advantage none of the other instruments of other makers known to the writer possesses. From the drawings in the hands of the secretary, it appeared to me and a few others, that the instrument could be used for small surveys and for finding distances (in straight lines) to any distant object miles away. This of course may be quite a mistake on my part, and it would certainly be interesting and instructive (to me at least) if we could learn the exact nature and workings of the instrument, and even to know if it is *original* or not. And I would therefore, with your kind indulgence, take the present opportunity of asking Mr. Mackenzie through the medium of your widely circulated and valuable Journal, to come to the front and give the public a fair and impartial explanation of what his instrument can do in the direction I have already hinted. What, I would ask, did he get the silver medal for? Surely not for saying that he invented a new

Dendrometer, exhibiting it as such, and then and for ever consigning it to the precincts of his antiquarian repository. It appeared to me that the only fault, practically speaking, that this model instrument had, was its faulty construction. It was said to be made by a well-known philosophical instrument maker in Edinburgh, but I can assure the maker that he had *no* credit for his work, the joints being in a most rickety and unsatisfactory condition and much against the instrument at the trial.

The information I would ask Mr. Mackenzie to give is: What are the merits of the instrument? Will it do its work as shown in the drawings referred to? Are there really no calculations required in working it? Where can it be bought, and at what price? The fact of my being at first rather indifferent in watching the trial, and in consequence only getting most of my information second hand, makes me trouble you with this correspondence; but I have no doubt many foresters will be anxious for information on the same points.

If this 'Mackenzie Dendrometer' is what it was represented and what it appeared to several to be, we cannot have one of them too soon. It seemed quite a small article but had a rather long staff, perhaps not an objection in walking through a rough country or woods. RATHO.

15*th February*, 1884.

SIR,—I have just received 'FORESTRY' for February, and at page 300 I find that 'P. J. Carter' and 'J. L. L. McGregor' make reference to my 'Dendrometer,' and there state that 'the instrument is a very old one, and is commonly known in Germany as Koenig's Messbrett, and that it was brought under the notice of English foresters (not Scotch) by Mr. Amery in his Notes on Forestry, in 1875.' It is certainly somewhat flattering to find one's name identified with such authorities. But I have to inform Messrs. Carter and McGregor that I never saw nor heard of Koenig's Dendrometers, nor the work published by Amery in 1875.

'P. J. Carter' further remarks that 'it seems strange that *a silver medal* should be awarded by the Scottish Arboricultural Society for an old and well-known instrument of this kind.' I believe the Scottish Arboricultural Society were as innocent of the knowledge of Koenig's Messbrett as what Mr. Kay is. Hence the award was honestly won I may also state that the idea is neither stolen nor strayed, and it may astonish 'P. J. Carter' and 'J. L. L. McGregor' to know that I got an award from the Scottish Arboricultural Society as far back as 1869—*fifteen years ago, and six years before Amery published his book!* At that time it was figured and described in the Society's 'Transactions,' but has only lately been brought before the notice of the public.

It may be somewhat interesting to give a short outline of how 'Kay's Dendrometer' came to be constructed. Many years ago it occurred to me that there ought to be a more simple means of ascertaining the height of trees and other objects than by having recourse to mathematical calculation. Having turned the matter over in my mind, I set to work to construct a quadrant to a fixed scale, and after having it so far constructed, it occurred to me that by a simple modification it could be made to measure height at any convenient distance, and that without any calculation.

Having thus elaborated the idea, and after having my first sketch completed, my brother and sister, who knew of my little invention, were very anxious one day to have the 'Dendrometer' put to the test, and they concocted a little plot to make me try the Dendrometer on the flag-staff in front of my house. After being prevailed upon, I at last set to work to ascertain the height of the pole. I need scarcely say all eyes were directed towards me. At last I pronounced the height, whereupon my brother observed that it would do. This somewhat astonished me, and I asked how he knew. 'I know,' he said, and kept me puzzling over the matter for a while. At last I was told that, in order to test the accuracy of my Dendrometer, they had measured the haulyards of the flag-pole. Thus I was put to the test and did not know of it.

The instrument has lain in abeyance since 1869, till, two years ago, I wrote Mr. M'Laren, secretary of the Scottish Arboricultural Society, asking the liberty of the Council to have it again brought under the notice of the Society, as there was a great want of some practical method of measuring the height of specimen trees at the annual excursions, and that I was afraid that, from a misprint in the initial letters descriptive of the instrument when it appeared in the Society's 'Transactions,' that it had never been properly understood.

My application was acceded to, and a practical illustration of the construction and mode of using the instrument was given, which met with general approval; and with the concurrence of the Council I was awarded a *No.* 1 *silver medal,* which I hold with the greatest veneration.

The instrument has lately been put in the market, and has been well received and favourably spoken of. Mr. Fowler, writing in the *Gardener's Chronicle*, remarks that 'Kay's Dendrometer is one of the cheapest, simplest, and best that he has ever come across.'

Woods and Forests also observes: 'There are various methods of ascertaining the height of trees, all more or less satisfactory, but the simplest and most efficient contrivance that has come under our notice is a little instrument that has recently been invented by Mr. Kay.'

The *Graphic* also observes that 'A most ingenious instrument for measuring the height of trees has been invented by Mr. Kay, of Rothesay. It is too abstruse in its construction to be here described, but it will suffice to say that it saves a vast amount of trouble, and does not require a year's practice in order to work it.'

I shall be pleased to hear how Koenig came to construct his Messbrett.

JAMES KAY.

TREE RECORDS.

SIR,—Can any of your readers inform me by reference to tabulated lists in their possession, whether there are statistics of any specimens of the *Cytisus laburnum Alpinum* and *Castanea vesca,* of much greater dimensions than the annexed? Further, for the sake of comparison, whether any that may be mentioned are growing in England or Scotland?

I hope I may have the favour of an early reply to enable me to complete some preparations for the Exhibition, the entries for which close soon.

WILLIAM F. GUNN.

Nutwood, Strathpeffer, Ross-shire, N.B.,
February 19*th*, 1884.

CHESTNUT (77 ft. high).

Girth at 1 ft. up = 25 ft. 7 in.
„ „ 3 ft. = 21 ft. 10 in.
„ „ 5 ft. = 20 ft. 2 in.

Length of bole, 15 ft., and circumference of spread of branches 207 ft. or a diameter of 69 ft.

LABURNUM.

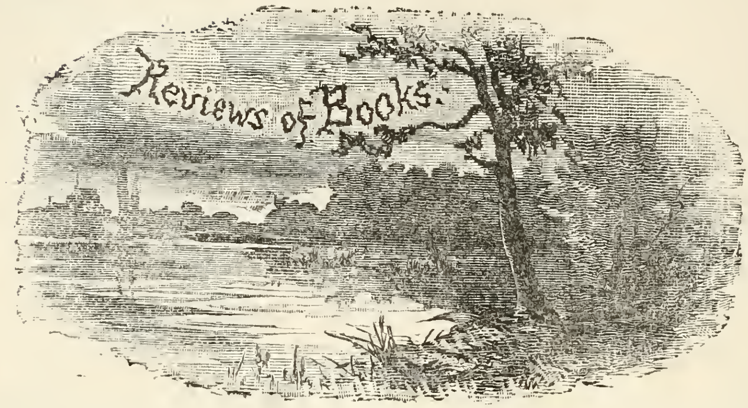
Girth at 3 ft. 0 in. = 8 ft. 6 in.
„ „ 5 ft. 6 in. = 9 ft. 9 in.

Divides into two large branches at six feet from the ground.

Girth of largest branch 6 ft. 5 in.
„ other „ 5 ft. 1 in.

The present length of the tree is 33 ft., but the largest branch was cut at 11 ft. long, and the other at 20 ft. long. The tree fell many years ago, and the above trunk is not very badly decayed, but the two lesser branches lying on the ground have taken root and are growing again.

It is situated on the lawn of Castle Leod, Strathpeffer, Ross-shire.


Reviews of Books.

The Florist and Pomologist. Nos. 73 and 74; January and February, 1884. Edited by THOMAS MOORE, F.L.S. London: W. Kent and Co.

THE two numbers before us of this well known and useful publication commence a new volume. With the January number is given a finely-coloured plate of the Rose Merveille de Lyon, and one of the Raspberry 'Lord Beaconsfield.' This last-named illustration is particularly good.

The plates in the February number are those of *Begonia albia* and the Herefordshire Beefing Apple. In addition to the coloured plates there are some wood illustrations, and the accompanying letterpress is of the usual excellence.

WE have to acknowledge with brief mention several other publications. The first of these is No. 4 of a new publication called *The Science Monthly*. It is capitally printed and is also illustrated, and the contents are very various and interesting. Next on our table—and we fear it has been waiting some little time for acknowledgment—is *A Familiar Talk about Trees*, by FRANKLIN B. HOUGH, published at Concord, by the Republican Press Association. This is no more than a *brochure* of 12 pages, being in fact the substance of a lecture, but it is nevertheless interesting and profitable, and deserves a word of cordial acknowledgment. Then comes the Annual Report of the Director, Mr. Charles Sargent, of the Arnold Arboretum, to the president and fellows of Harvard College. Published at the Cambridge (U.S.) University Press, by John Wilson & Son. We have also received the handsome and profusely illustrated 'Floral Guide,' for 1884, of Messsrs. H. Cannell & Sons, The Home for Flowers, Swanley, Kent. Lovers of Forests should obtain this useful and elaborate publication.

A Record of Service.—A correspondent writes:—'In these days of short service the following is worthy of record:—A service, in each case reaching over half-a-century, has just been brought to a close through the death of three faithful servants in the employment of Mr. Papillon, of Crowhurst Park, Sussex, and Lexden Manor, Essex. James Head, for 60 years head gardener at Lexden Manor, and five years previously in the same capacity with another member of Mr. Papillon's family, making up a service of 65 years in the same family, died January 12, aged 85. Samuel Saxby, five years estate carpenter and 50 years bailiff and woodreeve at Crowhurst Park, died February 3, aged 82; and on the same day, aged 77, James Saxby, for 60 years sawyer on the same estate.'—*Times.*

A Large Corsican Pine.—Mr. A. D. Webster, of the Penrhyn Castle Estate, writes to a contemporary, that 'probably the largest Pinus Laricio ever felled in Britain was last week sent to our sawmill to be cut into boarding. The cut end was 32 inches in diameter and at 9 feet it measured 6 feet 2 inches in circumference. Eighteen feet in length of the cut end was free of branches, and as straight as an arrow, and contained exactly 30 cubic feet of timber. The wood appeared of excellent quality, resembling very closely the red deal of commerce, and contained a great quantity of resin. This tree was growing on almost pure gravel, and but for an accident would never have been removed from the position it so nobly filled.'

The 'Major Oak'—During the recent gale, said a contemporary a short time since, one of the most noted trees in Sherwood Forest fell a prey to the wind's violence. It was known as the 'Major Oak,' and was situated near Edwinstowe. The tree, a grand old Oak, had a girth of 29 ft., and 'the circumference of the outspread tree at the utmost extent of its branches was two hundred and forty feet.' It was at one time called the Cockspen Tree, because its interior was used formerly as a hen-roost. Latterly many picnic parties have gathered in the hollowed-out trunk, and in a history of Worksop the following reference is made to the tree:—'Seven persons at once have been known to partake of a meal in it; while no doubt with a little contrivance it might have accommodated more.' Notwithstanding its internal decay, the old Oak (which has existed for more than seven centuries) was one of the noblest trees in the kingdom. A correspondent writing subsequently to the same paper said:—Your readers will be pleased to learn that the late storms in Sherwood Forest have not been so fatal to the 'Major Oak' as would appear from the recent paragraph in your paper. During the high winds on January 23rd, a large branch was severed from the top of the tree, measuring seven feet in girth near the fracture, but when the tree is again covered with its summer foliage an ordinary observer will scarcely notice the damage. No mischief was done by the storm of January 26th; the branches which were hung in chains are still in their places, and there is no doubt the Major is still the finest tree in this neighbourhood, and may still be called the 'King of Sherwood Forest.'

THE 'OAK' AT HEADINGLEY.—Many of our readers will learn with regret that a landmark well known in Leeds and the district has been seriously damaged by the recent gale. This is the ancient Oak tree which stands in the garden of Mr. Moat at Headingley, near the inn to which it has given its name. The tree is supposed to have been planted eleven hundred years ago. Whether that be so or not, its immense girth and venerable aspect permit no doubt to be entertained of its great age. Its life has, of course, long since departed; few of the old inhabitants of the district can recollect its showing any sign of vitality; indeed, it must have been decaying for centuries. For many years its vast trunk has been a mere shell—so hollow that it has served the purpose of an antique summer-seat in the garden, and the recess so capacious that two persons may sit comfortably in it. With the ivy tenderly embracing it, as if aware of its feeble condition and imparting to it some semblance of life, it has preserved until now a picturesque appearance. Tradition says that the tree in its prime was a well-known trysting-place; that under its wide-spreading branches Knights Templar were wont to hold their councils; and that thither the rude cloth weavers of the district brought their fabrics for sale before Leeds was more than a mere hamlet. For some time past it has been apparent that the decay was so far advanced that the tree could not stand much longer. One of the violent squalls of January 23rd was at length too much for it. Suddenly a large portion of the upper part of the trunk, with the remains of two or three of its boughs and a mass of ivy, came crashing down into the garden; one of Mr. Moat's daughters, who was passing at the moment, narrowly escaping injury by the fall. Fortunately the lower portion of the trunk, with the summer-seat, still stands as an interesting relic of the past.—*Leeds Mercury.*

VOL. VII., MAY TO OCTOBER, 1883, OF FORESTRY was completed with the October Number, and is on sale, bound in handsome light green cloth gilt, beautifully illustrated, price 7/6.

VOLS. III. TO VI. of 'JOURNAL OF FORESTRY' (yearly volumes) are still on sale at 15s. each, bound in green cloth gilt. Vols. I. and II, are out of print.

VERY HANDSOME BINDING CASES for Vol. VII. are on sale at the Publishing Office, at 1s. 6d., or, 1s. 9d. carriage free

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NOTICE TO CONTRIBUTORS AND CORRESPONDENTS.

It is absolutely essential that all MSS. for insertion should reach the Editor *not later* than the 15TH OF EACH MONTH, *and at an earlier period of the month whenever possible.* Books for review must also be sent before the middle of the month. Letters for the Editor's Box should be as *short* as possible. The place for long contributions is in the body of the magazine. It is a *great assistance*, both to editor and printers, for MSS. to be well and legibly written, and on one side only of the paper.

⁂ Urgent communications for the Editor should be addressed (personally to him) Underwood, Kew Gardens.

WE understand that all the preliminary arrangements are completed, and that the Executive Committee are now ready to proceed with the active work of erecting the buildings, laying out the grounds, and arranging the various departments for the great International Forestry Exhibition at Edinburgh. The Exhibition buildings and galleries have been designed, with excellent taste and completeness, by Mr. Robert Morham, architect, Superintendent of the City of Edinburgh Public Works, and the erection of them has been placed in the hands of the well-known firm of builders, Messrs. W. Beattie and Sons, of Edinburgh, who are, we believe, strictly bound, under a heavy penalty, to have them all finished and ready for the admission of exhibits by the middle of June.

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During the past month, a very large addition has been made to the number of applications for space in the Exhibition, and up to the latest report that has reached us, applications are still pouring in. It is very satisfactory to record the enthusiasm which now prevails amongst all classes concerned in the success of the Exhibition. We had occasion to refer last month, in a somewhat pointed manner, to the apparent apathy of our foresters; and we are gratified to hear that they are now coming forward in greater numbers, and taking the deepest interest in making a display worthy of the name of British forestry.

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From the correspondence which has reached us since our remarks appeared last month, we are glad to learn that it has been much more a matter of diffidence than a want of interest in the Exhibition, which has kept back many foresters until the last moment. It is the first time that foresters in this country have had to undertake anything of the nature of competition at an International Exhibition, and many of them have a difficulty in comprehending what they should do in the circumstances; whilst others experience such an amount of what we may term bashfulness that they dare not mention the subject to their employers. But obstacles are easily met and overcome when men make up their minds, and our remarks will have not been made in vain if they bring both employers and employed to a proper sense of their duty.

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We have much sympathy with our correspondent, 'Wairds,' whose letter appears in our 'Editor's Box,' and we believe, from that and other evidence before us, that many foresters hesitated from the same cause, namely, natural modesty, and a doubt as to how their employers would view the matter, and as to the means that would be granted to make a creditable contribution to the Exhibition, and to permit them to visit and carefully examine it. These are matters for mutual arrangement; but it must at least be said for employers generally, that their purses are usually ready to help any one who can show good cause for seeking their assistance, and in this instance the goodness of the cause is self-evident, and requires no particular explanations.

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By the time these remarks appear the period will have passed for closing the entries, and we trust that none of our readers who desire to exhibit have omitted to make the necessary intimation. However anxious the Committee may be to admit every reasonable application for space, still there must be a limit as to time of entry, so as to allow of proper arrangements being made and facilities given to exhibitors for displaying their articles with the best effect. From what we hear, the open-air space is practically unlimited, and no doubt accommodation will be provided till the last moment for articles which can bear exposure to the weather, but those who have neglected making their entries before this late date should not lose a day in doing so, or they may be excluded altogether.

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Contributions have been promised, it is reported, from Her Majesty the Queen, the Prince of Wales, and others of the Royal Family; from most of the countries of Europe; the United States of

America; India; almost every British colony; various Government departments; most of the leading landowners in the United Kingdom, including the Dukes of Argyll, Athole, Buccleuch, Devonshire, Grafton, Montrose, Richmond and Gordon, Roxburghe, Sutherland, and Westminster; the Marquises of Bute, Hertford, Huntly, Lothian, and Tweeddale; the Earls of Aberdeen, Breadalbane, Courtown, Dalhousie, Fife, Galloway, Hopetoun, Haddington, Hardwicke, Kinnouil, Kintone, Northesk, Mansfield, Moray, Minto, Rosebery, Rosslyn, Seafield, Selkirk, Stair, Wharncliffe, Wemyss, &c.; the Countess of Rothes; Viscounts Clifden, Combermere, and Strathallan; and many more of the nobility and gentry of the United Kingdom. Nor are manufacturers and wood-consumers to be behind in forwarding their goods for exhibition, nearly all the leading houses being well represented; and, as a matter of course, nurserymen are taking a leading part in contributing their stores to the Exhibition. In short, it is now certain that the Exhibition will be thoroughly representative of every branch of British forestry, as well as illustrative of the forest products and forest industry of the world.

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In our next issue, we hope to be able to furnish our readers with details of the Exhibition building and grounds, the means of access from various parts of the country, the arrangements for receiving exhibits, and other information of a like nature, which may help our readers in making their arrangements for exhibiting, or for visiting the Exhibition.

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The deposition on our table of the annual budget of seed catalogues reminds us, if there were nothing else to do so, that Spring is again upon us. As the planting season proper dies away, the seed season comes on apace, so that there is really no rest for the forester and agriculturist. He must be always up and doing; and it must at least be a great comfort to him that his toil is lightened by all avoidance of worry and trouble concerning the sources whence he is to get the means for renewing his crop or stock. These are amply provided by the enterprising firms which make it a business to furnish everything necessary to the requirements of forest, farm, or garden. We have already announced some of the Spring catalogues. We have now to acknowledge those of Messrs. Little and Ballantyne, of Carlisle, and Messrs. James Dickson and Sons. Messrs. Little and Ballantyne's lis now before us is one of farm seeds, accompanied by descriptions of some of the leading pasture grasses (accompanied by illustrations). There is also a section on Ensilage, one on laying down land to permanent pasture, and lists of selected prize roots, seeds, seed potatoes, seed grains, &c., and a treatise on insect pests. Messrs. James Dickson and Sons, of the Newton Nurseries, Chester, send us their list of 'farm seeds,' with information as to sowing, illustrations of special roots, lists of grass seeds, clovers, and a score of other things suited to all farming, garden, and general horticultural needs.

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We have also to acknowledge *The Science Monthly* for March—a good number; *The Indian Forester* for January and February—publications which shall have more full attention later on, as shall also Progress Reports of Forest Administration in the Punjaub for 1882–3, and in Bengal for 1882-3. We have also received the Annual Report of the Proceedings of the Sussex Association for the Improvement of Agriculture for the Season 1883.

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ROOT BLASTING.—A series of very interesting experiments with dynamite recently took place on the Kilsall Hall estate, near Shifnal, the seat of Mr. Daniel Jones. The family, together with numerous visitors, were present to witness the operations, which were superintended by Mr. Thomas Johnson, Tower Street, Dudley, managing agent for the Explosives Company (Limited), London. Since the introduction in 1871, of dynamite as a powerful blasting agent it has been extensively used for agricultural purposes. Landowners and farmers, who have been troubled with huge boulder stones and tough roots in their fields, have been pleased to obtain the assistance of this powerful explosive as a remedy for removing them. The recent heavy gales, which seem to have been pretty universal throughout the country, have proved very destructive on estates thickly timbered, uprooting an enormous quantity of fine trees, indeed, it is roughly estimated that on one estate alone over a thousand trees have been toppled over. Perhaps nothing makes an estate look more slovenly or out of order than a lot of straggling roots lying about, and it was this that prompted the owner of the Kilsall estate to call in the aid of dynamite. The old style of removing and breaking up roots by stocking, wedging, and gunpowder is very slow and much behind the times. Mr. Johnson's method of root removing and bursting up is as follows:—He has invented and patented a useful tool, which he calls an earth borer, this he inserts between the two strongest fangs, and bores a hole at a convenient angle underneath the centre of the root. This hole is charged with dynamite, a small primer cartridge, with detonator and fuse affixed, is put on to the charge, and the hole is rammed up with damp clay or earth, the fuse is then lighted, the force of the blast breaks asunder the ties, and blows the root into sections or bodily out of the ground. A 1½-inch Gilpin auger is then used for boring the blown-out root, and these holes in their time are charged and fired as before, and the roots scattered into convenient pieces for removal. The roots on the Kilsall estate comprised Ash, Elm, Oak, and Beech, some of which were very large, measuring as much as 15 feet across, including ties and earth, and 6 feet on the face of the timber. The whole of them were demolished in three days, and Mr. Jones expressed himself highly pleased and satisfied with the results.

AN ITALIAN LAKE GARDEN.

THE sun-seeking traveller, discreetly leaving our cloud-canopied islands when October's early frosts begin to colour the woodlands, and anxious to settle down for the winter in some comfortable, quiet and cheap part of Southern Europe amidst beautiful scenery, cannot do better than 'pitch his tent' on the shores of one of the Italian lakes. Of the villages on Lake Como, Cadenabbia and Menaggio will most commend themselves by virtue of their aspect, there being no winter season at Bellaggio, on the eastern side of the lake, owing to its being shielded from the sun by a lofty hill. But perhaps the most popular resort of sun-seekers is Pallanza on Lake Maggiore. This highly-favoured little town commands a series of views of enchanting loveliness, and enjoys a larger share of sunshine than any other of the numerous towns and villages on the lakes. It has several large and well-conducted hotels, each boasting a beautiful garden, and at any one of these one can live well at from six to ten francs a day. In the Grand Hotel there were nearly seventy *pensionnaires* when I was there for a few days in the first week of last November, three-fourths of which number were English, so that society was not wanting, though the allurements of the opera and gaming-tables must be sought elsewhere.

From the promontory on which Pallanza is built the lake stretches away in three directions—north to Luino and Locarno, south to Arona, and west into the bight of the bay from which rise the foot-hills of the Simplon. The most striking mountain of the entire Lake district, Il Sasso del Ferro, 5,918 ft., rises from behind Laveno on the eastern shore; and a more exquisite outline than that which it presents as viewed from Pallanza could hardly be imagined by the most fanciful of artists, Hence, too, Monte Rosa with its five peaks, and the towering summits of the Simplon range, ever draped with glaciers and snow-fields, are seen piercing the blue of the western horizon. Along the shores of the lake at short intervals the white houses and red roofs of many a tiny village peep out from amidst luxuriant vegetation. The slopes of the foot-hills are clothed with Pine, Fir, Poplar and other evergreen and deciduous trees and shrubs, or with orchards of mulberries, chestnuts, figs, and olives, amongst which here and there a spreading vineyard alternates picturesquely. Villas and castles of the Milanese aristocracy are seen embosomed in woods and orange groves which run down to the very verge of the tiny cliffs, at the foot of which are breaking the wavelets of the lake. The trees, shrubs, and flowers of sub-tropical climes are everywhere growing and blooming with the utmost luxuriance; the air is redolent with the scent of fruits and flowers; in whatever direction one looks the charm of colour and outline and picturesqueness fills one with the keenest sense of enjoyment. Well may it be asked, Surely there is here no feature wanting of those which are required to make a perfect landscape? Snowy Alps, forest-clad hills, slopes of cultivated country, picturesque villages on the lake shore, stately *châteaux*, and here and there a *campanile* rising to break the lower outlines, groves of Pine and Chestnut, red-gray cliffs overhung with trailers, curve of creek and bay, islands rising from the dancing waves, and everywhere glimpses of the great lake winding away between the mountains to the far distance where its recesses are hid in a dim blue haze—all combine to render the landscape round Pallanza one of the most famous in Europe.

But of all these numerous features of beauty, none receive so large a share of attention as the four tiny islands which, stretching across the entrance of the bay between Pallanza and Stresa, appear to guard it from incursion much as the string of forts at Cronstadt protect the head of the Gulf of Finland. The Borromean Isles, however, boast no weapons or munitions of war, and their aspect is as peaceful as that of Cronstadt is threatening. Isola San Giovanni, the smallest of the group, is separated from the promontory at Pallanza by a strait not more than a hundred yards in breadth, and has on it a villa and chapel, round which is a pretty garden shaded with lofty shrubs. A mile away lies Isola Madre, the entire surface of which, with the exception of that portion which is covered by a singularly plain *château*, now only used for the lodging of half-a-dozen gardeners, forms a grand shrubbery, interspersed with undulating lawns of well-kept turf, and the resort of a larger number of birds than I saw at any other place in Northern Italy. This island, which is about half a mile in circumference, is, with Isola San Giovanni and Isola Bella, the property of Count Borromeo. One would naturally term it a garden, laid out as it is with walks and terraces and lawns, but the flower-beds are few only, and the general aspect of the island is that of a tract of woodland, parts of which have been turned into grass, whilst among the indigenous trees and shrubs appear a hundred species imported from northern and southern climes. When one has visited both this island and Isola Bella, the former strikes one as the shrubbery, the latter as the garden of the Borromeo family, the main feature of the one being arboriculture, of the other floriculture. But as specimens are to be found on Isola Bella of nearly all the superb shrubs and trees which are cultivated on Isola Madre, I may pass on to the more famous island.

Isola Bella rises abruptly from the rippling waters of the lake at a distance of a mile or so from Isola Madre, and is only separated from the southern shore of the bay by a strait about four hundred yards across. At its western end is the *château* of Count Borromeo, a huge building devoid of architectural beauty, and with a ruined wing which materially detracts from the general appearance of the island. This statement may be questioned by those who have not visited the spot, but they may be reminded that, though isolated ruins are often extremely picturesque, a building, a portion only of which is in ruins, imparts an air of desolation to the scene, unless ivy or some creeper throws a veil of green over the dismantled walls. Some of the rooms in the *château* are very beautifully proportioned, and amongst the large collection of pictures and statuary, there is enough to repay a visitor, whilst from the long grotto-like galleries beneath the building one gets exquisite views over the lake. For a short distance along the southern shore of the island extends a row of dilapidated cottages, which can hardly be considered picturesque. All the remaining surface of the island is occupied by the famous garden of the *château*, formed by Count Vitalio Borromeo some two hundred years ago, who converted what had been a mere barren rock into a fertile garden of sub-tropical shrubs and flowers.

The highest part of the island is occupied by a stone platform or upper terrace of considerable area, studded with statues and fountains of no merit: its bareness is somewhat redeemed by a few stone vases filled with flowers, but there is no denying the fact that this, the most conspicuous part of the garden, is the very part which offends the eye as being in bad taste.

To the west of this highest terrace, from which a magnificent panorama of the lake and surrounding mountains delights the eye, is the largest Camphor tree in Italy, said—and apparently correctly—to be sixty feet in altitude, and very evidently of the most luxuriant growth. To the north of this, and facing Pallanza, is the most secluded, and perhaps—being less formal in style and more noticeable for floriculture than the other parts of the garden—the prettiest bit of the island. It is a level tract of ground, some sixty yards in length by forty in breadth, the entire area, with the exception of that part of it which is occupied by parterres, being covered with a lawn of well-kept turf. Here are clumps of *Azalea*, *Acapanthus*, and *Caladium giganteum* interspersed with sturdy *Yuccas* and grand specimens of *Cupressus deodara*. Magnificent trees of *Camellia*, however, are perhaps the main attraction, reaching as they do an altitude of twenty feet, and thriving most luxuriantly. Around the lawn, at stated intervals are twelve grand trees of *Pinus strobus*, beautifully grown, and averaging eighty feet in height; and beneath their shade flourishes a superb Bamboo, the feathery foliage of which is ever tremulous in the soft breezes blowing from off the lake. Another feature in this charming retreat is afforded by a *Sequoia gigantea*—to Englishmen better known by the name *Wellingtonia*—of vigorous growth and about fifty feet in height. Descending towards the northern shore of the island through a shrubbery wilderness, one comes upon two or three fine specimens of *Pinus sylvestris,* evidently of considerable age, and fully a hundred feet high. Turning eastwards, an Orange avenue opens out before us, twenty finely-grown trees being planted at regular intervals on either hand, with hundreds of fine fruit clustering amongst the shining foliage.

Looking up, one sees terrace rising above terrace, each consisting of a narrow path with a wall some eight feet high on the land side ; and these walls are all thickly clothed with the abundant foliage of Citron, Lemon, Shaddock, and Mandarin, plentifully sprinkled with buds, flowers, ripening and ripe fruit. Coming round to the southern slopes of the tiny island, a gaudy peacock struts away in front of us along a terrace of Lemon trees, and we enter a grove of stately Magnolias, comprising thirty splendid trees, the tallest of which is forty feet in height. These, when in flower, must form as grand a sight as the Camellia trees in the north garden. On this side are several deep grottos in the rock-walls, filled with ferns and having enormous trailers of ivy, thirty feet in length, depending from above, and the slopes at foot covered with *Bignonia radicans,* interspersed with huge Aloes. Here, too are fine specimens of the Sago Palm, the *Picus gum-elastica,* and *Quercus suber* or Cork tree, each evidently suited by the soil and climate.

Ascending a slope of thick Japanese grass, overshadowed by a grand Cedar of Lebanon, we are confronted on an upper terrace by numerous flourishing specimens of shrubs and flowers from divers far distant countries. Here are clumps of *Hortensia,* the *Papyrus*, the *Callicarpa sinensis,* indigenous to China and Java, with pink clusters of fruit springing from the stems, the *Abelia rupestris* of China, with its delicate pink and white blossoms, the *Thea* in full bloom, *Indigofera decora,* with its acacia-like fronds and pinkish purple flowers, *Piper nigrum,* and *Olea fragrans,* with its rich shining foliage and exquisitely-sweet tiny white wax-like blossoms. Those that I have mentioned are but a few of the hundreds of foreign plants and shrubs which adorn the slopes and terraces of Isola Bella.

Granted that in places the statuary, fountains and stonework are in bad taste, it cannot be denied that, in the eyes of a lover of trees, shrubs and flowers, this is amply compensated for by the rich luxuriance of one of the finest collections of foreign flora to be found within such circumscribed limits. Add to this the fact that the island was originally but a barren rock, and one cannot forbear from paying homage to the marvellous climate of the Italian Lake district.

Of the exquisite beauty of the scenery to be viewed from Isola Bella, only those who have visited this far-famed lake garden are in a position to judge. Writers differ singularly in their opinions as to the island itself. Matthews has spoken of it as 'the magic creation of labour and taste—a fairy-land, which might serve as a model for the gardens of Calypso;' and De Saussure as 'a magnificent caprice, a sublime conception.' Hazlitt calls it 'a piece of confectionery hung about with wreaths of flowers.' But who can deny that, garden and surroundings together, Isola Bella forms one of the loveliest scenes in Europe?

A. G. GUILLEMARD.

ENSILAGE.

MESSRS. F. W. REYNOLDS & Co., of Edward Street, Blackfriars Road, S.E., are introducing a new system of weighting silos, which bids fair to prove a great assistance in popularising the method of preserving fodder for cattle. The present system of weighting silos is by placing on them stones and heavy weights, but the Messrs. Reynolds have adopted and patented an ingenious and efficient process of putting on a very much larger pressure, at the same time obviating the necessity for providing and lifting so much dead weight every time it is wished to remove the shutters for the purpose of refilling the silos. Messrs. Reynolds' system—which was also demonstrated by the help of a model—is as follows:—A chain is attached to the lower part of the wall of the silo in any suitable manner, either by taking it through the wall with a plate and bolt on the outside, or by weighting it in the ground with concrete or attaching it to a beam. Exactly opposite, on the other side of the silo, is a similar chain attached in the same manner. While the silo is being filled, the ends of the chains are thrown over the walls. After the material is put in the pit, covering boards are placed over it, and a stout transverse beam is laid on the top, stretching from side to side of the silo. In the ends of this beam are fixed brackets to carry movable rollers, over which the ends of the chains from either side are led. A chain-tightener is then hooked into the links, and on turning the handle of the screw the ends of the chain are drawn together, causing the beam and covering of the silo to sink, so as to press the material. Pins are then inserted in the links of each chain across the beam to hold it down, when the screw-tightener can be made to take a fresh hold of the chain for further pressure or be removed altogether. Any number of beams may be used, according to the length of the pit and the pressure required per square foot of surface, but the chain-tightener and rollers can be removed from beam to beam, so that only one set is sufficient for any number of silos. What are really required for each beam are the two chains and two brackets or bearings into which the chain-rollers are placed when in use. If, for example, a silo of 15ft. long by 12ft. wide is to be pressed with a pressure of 200lbs. per square foot of surface, two beams would be required, each having its two chains. In tightening the chains, a pressure of eight tons can be put upon each beam, or sixteen tons on both; and this force, divided by the area of 15ft. by 12ft., equals 200lbs. per square foot of surface. The silo may be any reasonable depth; an extra length of chain being all that is wanted. Should a greater or less surface-pressure be required, it is only necessary to place the beams nearer together or further apart. So easy and powerful is the action of the chain-tightener, that it is found that one man, by exerting a power of about 60lbs. (theoretically 40lbs.), can put a pressure of eight tons on the beam; therefore, one man only should use the screw, or unnecessary pressure may be obtained. By exerting the pressure once daily for about a week, it is found that the ensilage cannot be compressed further, except at considerable intervals; the application of continuous dead weight is therefore unnecessary. By these patent appliances, the pressure can also be instantly released, and the boards removed to complete the filling of the silo, or when the ensilage is to be cut; the pressure can also be applied at any depth of the silo, either at the extreme top or at any distance from the bottom. The covering boards for the silo may be two inches thick, and the transverse beam for a silo of 12ft. wide should be about nine inches wide by seven inches deep.

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Forestry in Bedfordshire.—Mr. Arthur Ransom, one of the proprietors of the *Bedfordshire Times,* has just been instrumental in reviving the long-defunct Horticultural Society of Bedford, and from an article which appears in his journal in connection with the subject we extract the following :—" Another point deserves attention. Forestry is at last beginning to obtain the attention in England that it deserves; but at present it has no recognition in the ordinary exhibitions connected with the culture of the ground. Neither Agricultural Societies nor Horticultural Societies as a rule offer prizes in arboriculture. The subject seems to belong to the Horticultural Societies, as arboriculture is certainly in many cases a part of a gardener's duty. Here we venture to think is scope for much useful effort on the part of our new Society, especially in a county where there are so many fine woods, and where moreover there are many parks and plantations for pleasure, besides not a little valuable timber scattered about the fields."

FORESTRY IN BRITISH BURMA.[*]

THIS report discloses a very high degree of sustained activity and continued advancement on the part of the Indian Forest Department. It also discloses incidentally many difficulties that have to be contended with in prosecuting the very useful and necessary work of forestry. The climate of some of the Burmese forest districts is so unfavourable to human health as to be dreaded by the natives themselves, and work is not unfrequently interrupted by fever and sickness. The European forest officers are obliged to go on furlough and to change their posts more frequently than would be necessary in a better climate; but the department seems to be so organized that the administration does not suffer thereby. The regulated procedure and general uniformity of operations permits of one official taking up and continuing the work where his predecessor left off. Glimpses of the work which has been going on in the forests of Burma for many years may be obtained from the following extracts, which have been pieced together almost word for word from portions of the Progress Report.

There are in Burma 3,427 square miles of demarcated State forests, and proposals for the constitution of further reserves will be very carefully considered before they are sanctioned. The selection of further reserves will, however, continue as long as valuable Teak areas are available which can be reserved without inconvenience to the people, and which are not likely to be required for the extension of cultivation, especially as the proportion of reserves to the total area of the province is as yet small. Of the reserves, as yet only 211 square miles have been brought under fire protection, at an expense of about seventy rupees per square mile. The principal operation of fire protection seems to consist in the clearing and keeping clear of straight fire-traces at least broad enough for the passage of an elephant.

The net revenue of the forests of British Burma for the year 1882–83 was in excess of the previous year in the two Circles, and amounted to—

Net revenue of Tenasserim Circle ...	Rs. 4,86,842
Net revenue of Pegu Circle	7,88,098
Total net revenue	Rs. 12,74,940

Or more than £100,000.

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[*] 'Progress Report of Forest Administration in British Burma for 1882–83.' By Lieutenant-Colonel W. J. Seaton, M.S.C., Conservator of Forests, Tenasserim Circle, and H. C. Hill, Esq., Officiating Conservator of Forests, Pegu Circle. With a Review by the Chief Commissioner, and Orders by the Government of India. 1883.

Tenasserim Circle.

In the Tenasserim Circle the addition of 153½ square miles to the area of sanctioned State reserves, and final demarcation of boundaries of eight reserves, constitute the progress made in forest demarcation work during the year under review. Demarcation in the case of Teak localities may be said to be far advanced, and the area of State forests in this circle now reaches the total of 589½ square miles finally demarcated. There are, besides, 780 square miles of selected areas awaiting examination by a forest settlement officer, and 110 square miles of approved areas awaiting final sanction; while the other areas examined and awaiting sanction as village reserves amount to 17½ square miles. There are also large areas to the south at the sources of the Tenasserim River to be dealt with; but the question of reservation will depend in a great measure on the feasibility of removing the rocky obstructions in the great Tenasserim River and its large tributaries, at an expenditure commensurate with the revenue likely to be realized from the forests. Finally there will be the work of taking up village forest reserves in the more populous districts, and extending the work as may be necessitated by the increase of population in the interior. The expenditure incurred on the demarcation work of the year amounted to 690 rupees, and eight reserves were finally demarcated.

Linear valuation surveys, supplemented with a careful route survey with compass and chain, were executed during the year over 1,773 acres in the Upper Tavoy forests, and with the survey of the previous year make up a total area of 3,308 acres in these forests, on which the more valuable trees have been counted. The total length of these surveys was 206 miles, the aggregate of the numerous routes and forest tracks followed, and estimated to extend over an area of about 300 square miles of these forests. From the route survey a detailed map will be compiled of the Upper Tavoy Forests. A carefully detailed topographical survey of the reserves for the framing of regular working plans has not yet commenced in this circle. In the meantime, according to the plan of annual operations originally suggested by the Inspector-General of Forests and approved by the local Government, the East and West Salween divisions have been each divided into five blocks, which are to be thrown open in succession for a period of five years for the girdling of all first-class marketable Teak trees both within and without the reserves, selection within the reserves being subject to favourable reproduction and presence of seed-shedding trees. Thus a period of twenty-five years will be given for the extraction of all first-class marketable Teak trees throughout these forests; sufficient, it is assumed, within which to allow of trees of the second class to attain first-class size before girdling is resumed in any one part. When the map of the Upper Tavoy forests is completed, it will be possible to devise an annual plan of operations for the *Pyingado* and other valuable forests in that locality.

The Deputy Conservator at Moulmein investigated and dealt with fifty-five cases of breaches of forest rules. Measures undertaken during the past season for the protection of the usual reserves from fire have been on the whole successful. There were early showers, which unfortunately caused the protective establishments to relax their vigilance. However, out of 62,000 acres attempted, over 50,000 were successfully protected against fire.

The sanctioned reserves in this circle being either in the hills, where cattle are not reared, or in sparsely-populated localities, are all free from rights of 'grazing.' When the Kyaukket reserve was in course of being demarcated the question of allowing grazing for elephants was raised, but it was deemed advisable to exclude a definite area *in toto* for this purpose in preference to allowing such rights within the reserves. The proposed Martaban reserve is, however, an exception, being in the plains near Moulmein, and when sanctioned will provide a considerable grazing area to the villages in its vicinity. The department has not been under the necessity of fencing-in any of the reserves, and the villagers are, on the whole, careful to prevent their cattle from trespassing on adjoining reserves.

With regard to natural reproduction, hardly any observations were submitted by divisional officers during this year in any of the Teak localities, their time having been fully occupied with other urgent duties. On the hills where Teak occurs in bamboo jungle, and along the edge of the dry forests on the crests of the ridges, seedlings appeared to be plentiful, and promising trees of the third class in fair proportion, being about treble the number of second-class trees on twenty acres which were examined. The artificial reproduction of Teak in *taungyas* was continued, but smaller areas were taken in hand than in the previous year. This reduction is chiefly due to certain new conditions regarding the collection of Teak seed proving distasteful to some of the older hands among the cultivators, each individual being expected to collect two baskets at a cost of one rupee per basket. Owing to some surplus seed of indifferent quality of the previous year being used in two places, the area successfully cultivated was only eighty-four acres. In accordance with the orders of Government these Teak plantations on the *taungya* system have been included with the regular plantations in the same schedule. The regular Teak plantations are very small in extent, dating chiefly from the year 1856, and it is not intended to add to them. The work of cutting creepers and freeing Teak saplings from overgrowth in the Teak *taungya* plantations was carried on at an expenditure of from one to two rupees per acre.

Departmental operations have embraced as heretofore girdling, opening-up of streams for the floating of timber, extraction of timber from the forests, and the collection of drift and waif timber. The girdling work was satisfactorily executed, except in the East Salween division, and resulted in about 1,000 Teak trees being killed in reserved forest, and about 1,500 in forests outside the reserves, besides 3,000 trees of other kinds. The blasting work was successfully carried on in the Upper Tavoy River and its tributary, upwards of six rocky obstructions being removed. The timber operations of the year by Government contractors resulted in an out-turn from the Government forests of 14,000 tons of Teak timber and 4,000 tons of other kinds of wood. This was a considerable increase on the previous year's out-turn of Teak, the high prices ruling at Moulmein enabling the departmental contractors to bring out large quantities of pieces and logs of second-class timber. The cost of extraction of wood other than Teak varied between six and twenty-nine rupees per ton. In the South Tenasserim division the rates paid for extraction of light and heavy kinds varied only from five to six rupees per ton. These latter low rates on heavy woods are explained by the fact that the people on the Tavoy River and elsewhere, have long been accustomed to the floating of heavy woods. The bamboos used in rafting are also easily procured near the rivers, and likewise find a ready sale afterwards.

From the forests in the Salween division a few broad-gauge and narrow-gauge *Pyingado* sleepers, and from Tavoy nearly 11,000 *Pyingado* sleepers, chiefly for narrow-gauge railways, were turned out. The prices obtainable for sleepers at Calcutta do not leave much of a margin for profit; but it is desirable, nevertheless, to continue the work, and so be in a position to expand operations to meet local or other demands as they arise. In the Aturan division thirty-seven tons of *Padauk* planks were prepared for the Fatehgurh Gun Carriage Factory, but on delivery at Moulmein proved to be too full of defects to admit of being despatched. From this division three boat-hulls of *Thingan* wood were also received at the Moulmein depôt.

During the year, sea-drift and river-drift timber amounted to 6,000 logs, or 5,000 tons of Teak timber.

Produce removed from the forests in this circle comprises—

(1.) Teak timber extracted by leaseholders.
(2.) Teak timber disposed of in the forests.
(3.) Other kinds of timber from the leased forests.
(4.) Timber other than Teak sold in the forests.

(5.) Timber other than Teak removed from the forests under trade licences.

(6.) Minor forest produce removed from the forests under licences.

The high price of timber may be expected to lead shortly to the working of more leased forests. The new revenue rules came into force in July, making all timber subject to duty which is removed for trade purposes. It is as yet too early to form any opinion on their effect on the extraction of certain descriptions of timber; but one noticeable result of levying duty per log and not per ton, is the larger extraction of mature timber of greater length and girth than under the former rules. The total quantity of timber extracted from the forests under trade licences in the whole circle and timber upon which revenue was collected amounted to 25,000 logs.

Under the new rules all timber for *bonâ fide* domestic and agricultural purposes has been declared free within five miles of the place of production within the revenue circle.

The import trade of Teak timber with British territory from the Karennee, Gyaingtaung, and Siamese Shan States continued in a flourishing condition throughout the year, owing to the extraordinarily high prices obtainable in the Moulmein market. The number of Teak logs and pieces imported across the frontier by the Salween river, and reported at the Kado revenue station during the year, amounted to 117,000, having a tonnage of 140,000 tons, on which duties amounting to more than 64,000 rupees were collected. The total quantity of foreign timber imported into Moulmein during the year had a value amounting to 77,30,000 rupees. The average value was sixty-seven rupees per log, or fifty-six rupees per ton.

The export trade of Teak timber at Moulmein continued brisk throughout the year, consequent on the high prices ruling in Europe, and a fair demand being maintained in the Indian markets. The prices in Europe ranged chiefly between £13 10s. and £16 per ton. In the Indian markets they ranged between 95 and 120 rupees for squares, and 60 and 160 rupees for scantling, per ton.

The financial results of the Tenasserim Circle for the year under review show—

Receipts of departmental timber operations	Rs. 7,64,747
Other revenue	1,12,817
Total receipts	8,77,564
Total expenditure	3,90,722
Leaving as net revenue ...	Rs. 4,86,842

Or a net revenue of nominally £48,684. The success of the year's operations is mainly due to the high price obtained for the Teak extracted from the Government forests. The outstandings at the close of the year in the contractors' and disbursers' ledgers amounted to 46,000 rupees, of which 40,000 represented advances covered by timber in transit.

The Pegu Circle.

An inevitable result of the coming into force in July of the British Burma Forest Act, with the lengthy procedure prescribed for the formation of reserves, was that not a single tract was added during the year to the area of reserved forests. In the Tharawaddy division, however, the necessary formalities were gone through with regard to a reserve of thirty-eight square miles, which had been previously reported on, and at the close of the year, the period for appeal having elapsed, nothing remained to be done beyond the issue of the final notification declaring it to be a reserved forest. The Paunglin reserve, also, in the Rangoon division, with an estimated area of 124 square miles, was preliminarily notified under the Act, but was not finally disposed of by the end of the year. In the Toungoo division areas suitable for reserves, amounting to 246 square miles, were also preliminarily notified, and all claims disposed of; but the final settlement of these reserves must still occupy some months.

The small *Cutch* reserves in the Thayetmo district of the Prome division, containing some 6,000 acres, the settlement of which was last year considered unsatisfactory, have been dealt with, and now only await the result of any appeal which may be made against the orders passed. The importance of maintaining a continued supply of *Cutch* trees for the support of an industry that gives occupation, in Cutch-boiling and other processes, not only to a large number of Burmans residing within British territory, but also to immigrants from Upper Burma, has often been remarked upon, and the Government of India have specially pointed out the urgency of assuring the reproduction of *Cutch* by natural or artificial means. Throughout the Cutch-producing parts of the Thayetmo and Prome districts the powers of natural reproduction of the tree, both from seed and from stool, are so great that the majority of the sites of the *toungya* clearings are thoroughly well stocked with a young growth of *Cutch*. Numerous small areas on old *toungya* grounds have been selected for *Cutch* reserves, in which it is proposed to allow considerable rights to grazing, bamboos, and firewood to the villages, which in these comparatively thickly populated districts must of necessity be in close proximity to any reserves which may be constituted.

With a view to check the obstruction of the forests situated in the shelter of the Rangoon River and to guarantee a constant supply of fuel to the large villages situated in the rich plains between Rangoon and the sea coast, steps have been taken to demarcate such tracts as remain under forest and of sufficient extent, and to declare them village forests to be set apart for the benefit of certain defined village communities.

Final demarcation of reserves was carried on in the Prome, Rangoon, and Toungoo divisions. In the Prome division the work was completed throughout the outer boundaries; but the limits of the recently settled Karen areas within the reserves had still to be permanently marked. In the Rangoon division the demarcation of the Zamayi reserves was in hand, but the work was greatly retarded by a man-eating tiger dispersing the Karen coolies in March. The Karen oracle had to be consulted, and this only sanctioned a further supply of labour on the 28th of April.

In the Hanthawaddy and Tharawaddy districts the survey of forty-two square miles was completed on the scale of four inches=one mile and twenty-five square miles of advance work. Some reserves were surveyed and mapped out on the sixteen-inch scale, and forty-two square miles were prepared for survey. The cost, exclusive of supervision, of the survey in Tharawaddy was 100 rupees per mile for the twenty-five miles of advance work, and 447 rupees per square mile for the forty-two square miles completed. In the other district the Forest Department bore only a share of the cost of surveys.

The surveying party suffered very much from dysentery and malarious fever, partial and in some cases total blindness, a most malignant form of itch, ulcers and scurvy. Sickness was the most serious obstacle to be contended against. Out of a mean strength of 364 khalassies twenty-six died, a large number had to be invalided, and fully forty per cent. of the menial establishment were prostrated; that is, at no period of the field season were there more than 200 effective men. The native surveyors suffered more or less, and the hospital assistant was unable to leave his bed for six weeks or two months. Food of every description had to be sent up on elephants a distance of not less than twenty-five miles, not a particle being obtainable on the spot. When it is considered that 400 men had to be provided with the commonest necessaries of life, some idea may be formed of the heavy responsibility which the arrangements alone imposed, since the slightest hitch would have been disastrous.

The operations of the detail surveyors were carried on chiefly in the Thonzè reserve. The features are of an intricate nature, consisting of a few high ridges, the interlying valleys being cut up by innumerable watercourses, which are generally so wide, deep, and thickly wooded that it is a most difficult matter for the surveyor to distinguish between the large and small ones, and therefore he has generally to follow up the courses of all in order that important features may not be omitted. The forest is extremely dense, almost impenetrable; every ray, either for the traverser or plane-tabler, has to be cleared more or less, so that the work progresses literally by inches. The only clearances are those made by the Karens, which are few and far apart. With these exceptions the country is a wilderness, with nothing to relieve the eye. After a time the silence and monotony become so painful that the longing for a change is beyond all description. The Burman cannot endure this, and it is only the European or the Hindustani who has sufficient perseverance to plod his weary way. For three months a fog, quite as dense as any experienced in England, out of London, overhangs this desolate region. It lifts at about 10 a.m., up to which hour there is a constant drip, drip from the trees, and the undergrowth is reeking with moisture which soon causes fever and dysentery.

Assuming that a topographical survey on the scale of one inch= one mile costs seventy-five rupees per square mile, that scale being the one usually adopted for ordinary topographical purposes, then—

(*a*) A four-inch scale survey as carried on this year would cost about 450 rupees per square mile, and the amount debitable to the Forest Department would be about 360 to 375 rupees per square mile.

(*b*) A survey on the scale of two inches = one mile would cost about 200 rupees per square mile, and the amount debitable to the Forest Department would be about 125 rupees per square mile.

(*c*) A *modified* four-inch scale survey would cost about 210 rupees per square mile, and the amount debitable to the Forest Department would be about 135 rupees per square mile.

A modified four-inch scale is one that would suit the requirements of the Forest Department. It would be required to show the following features correctly:—The main watercourses, the main ridges, the boundaries between the different classes of reserves, slopes above thirty degrees where they can be obtained along the routes taken up by the detail surveyor, well-defined dragging-paths and footpaths, and karen areas and plantations. The rest of the details would be approximate, the minor watercourses being shown by dotted lines, and the spurs, slopes, &c., in a different colour (in the field sections) to that used for the portions accurately surveyed. The out-turn, according as *a*, *b*, or *c* is adopted, would probably be about 140, 360, or 300 square miles per annum. The reserves in the Pegu circle aggregate 2,436 square miles. It is clear, therefore, that if the survey of these is to be completed within a reasonable time, we must be contented with something less than the excellent maps that are being turned out at present, and which are estimated to admit of a yearly out-turn of only 140 square miles.

A Working Plans Department was started this year, and operations were commenced in the old Mokka-Bilin reserve, and extended over the fire-traced area, or about twenty-four square miles. The formation of working plans seems, however, not to have been completed owing to the want of some maps, which, although expected, were not ready in time.

The entire area to be included in each working plan was to have been valued by the careful counting of all trees, and the result used as a standard for the valuation of other similarly constituted forests; but this was found impracticable owing to the unreliability of the men employed as enumerators. Should even trustworthy men be found to enumerate, the difficult configuration of the ground, and the almost impenetrability of portions of the forest would be sufficient to so retard the work as to make it inordinately expensive. In order to expedite the work a system of linear surveys was substituted; and in this way 578 acres, or four per cent. of the total area, were correctly surveyed and valued. Although this is a very small percentage, it seems sufficient, considering the very poor average of Teak trees to the acre contained in our natural forests. There are usually only about fifteen to seventeen Teak trees on an average per acre, of which nine to eleven are below one foot in diameter. The average number of trees of all kinds per acre is thirty-three to thirty-five, bamboos for the most part completing the forest. An unsuppressed Teak tree seems to attain six feet in girth in about 105 to 110 years.

Annual plans of operations will in future be submitted by divisional officers, with the Budget estimates. So far a general plan of operations for the whole circle has been worked up to. The area to be planted yearly with Teak on the *taungya* system was fixed at 1,000 to 1,200 acres, and in endeavouring to bring the Teak *taungya* cultivation up to this figure it has been found necessary to modify and extend the area protected from fire. The number of trees girdled has been limited in accordance with an estimate of the marketable Teak trees, standing outside reserves. There are still outside reserves supplies for the girdlings of two years to come, estimated at 26,000 to 30,000 trees. The out-turn of the forests being to some extent dependent on casualties amongst elephants, and water in the floating streams, can only be estimated for the entire circle, and will always be liable to differ considerably from any plans of operations for divisions. The number of elephants attached to the depôts and different divisions of the Pegu circle was thirty-five. The average monthly cost per elephant amounted to a little over thirty-four rupees. The mortality among contractors' elephants was very great during the year.

The revenue was derived from the following main sources:—

	Rs.
Timber and other produce, exclusive of railway sleepers, removed from the forests by Government agency	11,74,804
Railway sleepers	1,67,505
Consumers or purchasers of timber ...	1,38,795
Firewood and charcoal	2,655
Bamboos	6,004
Grazing and fodder grass	173
Other minor produce	74,612
Confiscated drift and waif wood	45,068
Miscellaneous	16,701
Total receipts	16,26,317

The principal items of expenditure were :—

(A) *Conservancy and Works* :—

	Rs.
Removal of timber and other produce, exclusive of sleepers, by Government agency	3,54,291
Railway sleepers	1,62,702
Consumers or purchasers of timber ...	6,501
Management of confiscated drift and waif wood	19,530
Purchase and keep of cattle, and hire ...	32,305
Communications and buildings	21,756
Demarcation, Improvement, and Extension of Forests :—	
Demarcation...	8,671
Compensation for land and rights	76
Survey and working plans...	6,073
Plantations	23,283
Protection from fire...	9,903
Other works	165
Miscellaneous	14,897
Total (A)	6,60,153

(B) *Establishment* :—

	Rs.
Salaries	1,41,494
Travelling allowances	24,426
Contingencies	12,160
Total (B)	1,78,080
Total expenditure (A) and (B)	8,38,233

The receipts and expenditure of the year for the Pegu Circle show a surplus :—

	Rs.
Total receipts	16,26,331
Total expenditure	8,38,233
Net revenue for the year ...	7,88,098

Which is a considerable advance on that of the previous year for this circle.

A FOREST WONDER.

LITTLE imaginative penetration is required to discover the reason why the traditions of the grand old forests of England are immemorially mingled with the associations of Royalty. In the days when England was supposed to be exceptionally 'merrie'—from what cause the historic philosopher has vainly tried to explain—possibly the most enjoyable pastime of Royalty was the sport afforded in the fine woodland tracts which then existed, and a proportion of which still exists to this day. Then the regal diversion, inseparably connected with deer-hunting, was ample and extensive, and the representatives of noble houses did not fail to emulate the bold freebooter Robin Hood in the chase of the fleet-limbed dweller of the forest. Consequently the forest of Sherwood, the New Forest, and all the great stretches of woodland beauty attracted to their picturesque bowers the *preux chevaliers* of the period, so that the kingly sportsmen were entertained and provided with as much pastime as their ardent souls might desire. The forests were then the 'happy hunting grounds' of kings and their courts, and it would be difficult to discover the woodland region of any magnitude where Royalty has not assisted in the development and perpetuation of those memories which make up the interesting history of some of our famous woods and forests. While Sherwood boasts of its Robin Hood, it can also lay claim to the patronage of King John, whose hunting palace in the woods partly exists to this day; and while the New Forest clings to its traditions of Rufus, Epping Forest remembers the royal lady who, above all preceding kings and queens, has so wisely and lovingly guided the destinies of this great nation. Around these arenas of sport we find the 'stately homes of England' about which Mrs. Hemans sings so delightfully; and in Sherwood Forest especially is this the case. Its glorious leafy domain comprises the seats of the Dukes of Newcastle and Portland and the Earl of Manvers; while on the long line of contiguous forest which stretches from Mansfield to Nottingham is the beautiful ivy-adorned abbey where Lord Byron sighed and sung of his adorable Mary; and Bestwood Lodge, one of the seats of the Duke of St. Albans; with Hardwick Hall, 'more glass than wall' (the seat of the Marquis of Hartington); and Bolsover Castle, the fantastic erections of the 'ever-building' Elizabeth Countess of Shrewsbury, skirting the forest as it merges into the corn-growing vales of picturesque Derbyshire. Few of the forests in this kingdom can claim to find room for palaces of such noble heritage; and in each case the ducal mansions, environed by gigantic Oaks and undulating parks, are to the forefront for magnitude and beauty. Undoubtedly the oldest of the group is Welbeck Abbey, the seat of the Duke of Portland, a mansion constituting the wonder of which we wish to speak. It is the *chef d'œuvre* of human eccentricity, a palace as labyrinthine as Mount Ida, a gorgeous specimen of perverted ingenuity as perplexing as it is astonishing. Originally it was a monastery for monks of the Præmonstratensian Order, and, like all structures devoted to the 'mortification of the flesh,' it is situated in a goodly vale surrounded by a thickly-wooded barrier, with every forest luxury obtainable at a moment's notice. As a work of architectural art little need be said; but the proportions are ample, and what it lacks in external grace is compensated for by internal comfort. The great work of reconstructing Welbeck was undertaken by the 'Invisible Prince,' as the late Duke of Portland was called, and was far from complete at the time of the eccentric nobleman's death. For years he spent his princely income, amounting from land alone to upwards of £175,000 per annum, in the reconstruction of the Abbey, and enough of the work was finished at his death to make the house one of the most extraordinary buildings in the world. Five years ago Welbeck was like a 'sealed book,' and the fortunate visitor who had penetrated the mysterious region felt as elated as if he had discovered the North-west Passage, and did not fail to retail his experiences on every favourable occasion. Shut up in his favourite library the invisible duke pursued his daily avocation of planning and plotting—planning for the construction of some ingenious marvel, or plotting to keep his magnificent mansion more completely secluded from the eyes of the vulgar world. At that time upwards of one thousand artificers were employed on the estate; so that to keep the Abbey from the rude gaze of even his own workmen required a stretch of genius which in its accomplishment has never been surpassed. Across the park the workmen were in the habit of passing to their homes at Cresswell, Whitwell, and Worksop, and the occasional glances they gave at the ducal residence disturbed that feeling of seclusion which the owner desired, and consequently ingenuity was taxed, and cost disregarded, in the attempt to make the mile-and-a-half footpath across the park as joyless as possible. Following a strange inclination for subterranean construction, the late duke hit upon the expedient of making a tunnel across the park, so that his army of workmen could pass to and fro without disturbing the serene repose which he longed for; and in the famous Welbeck Tunnel, he created—what Mr. Gladstone has endorsed—one of the wonders of the world. The structure is as wonderful as it is gigantic. During the day it is lighted by enormous plate-glass bull's-eyes, superseded at night by hundreds of gas jets. The floor is excellently asphalted, and the tunnel is high enough and wide enough for carriages to pass along. It was on this subterranean roadway that the Prince of Wales was conveyed when he honoured the present Duke of Portland with a visit at the latter end of the year 1881. Nothing more effectual could have been designed for the object the eccentric nobleman had in view. Stepping into the tunnel during the hot days of summer the traveller feels as if he had walked into an icehouse, and the whole length of its interior can be traversed without catching the slightest glimpse of the Abbey, or the beautiful park under which it passes. Walking through the park the pedestrian can trace the tunnel by means of the skylights referred to, as it passes under clumps of trees and groves of Rhododendrons ; and the same idea of burrowing is carried out in the well-appointed lodges scattered over the huge domain.

Under and about the Abbey, however, the duke displayed the most brilliant capacity for subterranean construction. The private tunnels and underground apartments attached to the Abbey are indescribable specimens of costly thought and princely effort, and afford the most astonishing indication of the eccentricity which marked the career of the late Duke of Portland. In these labyrinths the noble owner could pass from one building to another in all sorts of weather, and appear at any moment at a required spot without giving warning of his approach. The perfectly constructed passages lead to an underground suite of rooms of extraordinary magnificence. Upwards of £20,000 to £30,000 were spent in draining and preparing the ground for this palace of Aladdin, and the work was carried out with a total disregard of the cost. A subterranean ballroom, 166 feet long, forms part of the number, and for festive delight it would be difficult to imagine a more perfect apartment. The walls are hung with mirrors of great value, with beautifully adorned alcoves wherein the 'whirlers' can retire and seek seclusion from the arena of gaiety. The decoration is artistically pleasing, and the visitors can roam about from one underground conservatory to another, or be 'lifted' without effort to the upper air. The doors are of enormous weight and size, and, like the famous Chatsworth 'garden gate,' are so perfectly hung that they respond to the lightest touch, and close with a precision accurate and astonishing. Through these subterranean apartments the visitor can roam until wonderment becomes entirely satiated ; passing through a magnificent library into a spacious billiard chamber, with reception rooms and writing rooms in proximity to these superb *salons* of delight. In every detail the most refined taste has been displayed, and the furniture compares favourably with the elegance of the decorations. The absence of fireplaces is a noticeable feature, the underground palace being warmed without visible flame or annoying draught.

Passing along one of the underground passages which honeycomb the foundations of the Abbey, the visitor reaches the handsome structure which is generally known as the Duke of Newcastle's riding school. This Duke of Newcastle, a staunch Royalist during the Parliamentary struggles, lived to be richly rewarded for his loyalty to the Stuarts, and built a considerable portion of Welbeck, including the riding school referred to. He was esteemed a cavalier *sans peur et sans reproche*, and produced a treatise on horsemanship which was considered a valuable addition to the equine knowledge of that time. The marriage of his granddaughter gave Welbeck to John Holles, Earl of Clare, subsequently created Duke of Newcastle. The only daughter of this nobleman was given in marriage to the second Earl of Oxford and Mortimer, whose only daughter married the second Duke of Portland, and brought the Welbeck estates to the already opulent Bentincks. The riding school with which the Cavendish Duke of Newcastle was associated, was not constructed on strict lines of architectural beauty, and was afterwards converted into a picture gallery 182 feet long and well proportioned. The four great glass chandeliers in this vast apartment, each weighing a ton, are perhaps the most noteworthy features, and it was in this awe-striking room that the last Duke of Portland piled his magnificent collection of paintings, the works of the most celebrated masters of the Flemish and Italian schools, against the wainscoting, to mildew and rot in their undignified oblivion. Beneath the oaken floor immense wine cellars were constructed, with cast iron bins, and subterranean passages to connect the cellars with the principal rooms, and an underground railway to complete the display of ingenuity and eccentricity which everywhere abounds.

Another underground excursion through one of the most 'inviting' tunnels, if such dark passages can be so termed, ends at the new riding school, built by the 'invisible nobleman' to supersede the one just described. Externally the edifice presents the appearance of a gigantic public hall, and is of massive and portentous aspect. Undoubtedly the building is the finest riding school in the world, and an internal view is absolutely startling. A perfect forest of columns serves to support the finely arched roof, and the bewildered spectator would immediately come to the conclusion that he had been suddenly transported into a large railway station, if it were not for the artistic features which prevail throughout the interior. The roof is of glass and highly ornamented iron, with cornices beautifully decorated with foliage and fantastic groups of birds and beasts. The school is 379 feet in length by 106 feet in width, and 50 feet in height, so that some idea may be gained of its enormous capacity; and some fifty horses can easily be exercised within its area.

Upwards of 8,000 gas jets are employed to illuminate the building, and when so illuminated a sight is presented which is truly marvellous. A little further on are the stables, coach-houses, &c., and the covered 'gallop' of one thousand feet long—another of the wonders of Welbeck. Around these buildings are picturesque dwellings, forming a little village, and chiefly occupied by stablemen and others. The houses are models of elegance and comfort, and as much care has been bestowed in their construction as in any of the marvels which are everywhere present in the vast domain. Not less remarkable are the extensive kennels, the cow-yards, cow-houses and dairies, while the gardens of Welbeck, stretching down to the edge of the lake, with a peach wall a thousand feet long, and an avenue of fruit trees of similar length, are features which no visitor would care to pass unnoticed.

The lake, which extends for a distance of four miles through the picturesque park, may be mentioned as affording an instance of the prodigality of labour and expense in the beautifying of the Norbertine monastery and its surroundings. Near the old portion of the Abbey, the lake dwindles to the proportions of a river, and an admirable asphalte skating rink is constructed on one of its banks. The rink is about half a mile long and twenty feet wide, and during the lifetime of the 'Prince' of Welbeck this pleasure resort was frequented only by the servants connected with the Abbey. In the centre of the rink is a model boathouse of rustic woodwork, with stores for skates, and rooms for dressing and refreshment.

Since the death of the eccentric nobleman, which took place a few years ago, to whose ingenuity and skill these marvellous achievements are mainly due, and the advent of the present Duke of Portland, a young man now about twenty-five years of age, and at the time of succeeding to the inheritance holding an important commission in the army, the palace of Welbeck has not been so effectually obscured from the eyes of the public. With a generosity which has earned its reward the young duke threw open the barred gates, and allowed the public to inspect a domain which for years had been invisible. The princes of the blood royal, and the scions of noble houses, who had stood at the gate like the Peri at the gate of Paradise, claiming impossible admission, were quickly invited to inspect the wonders of the place, and many availed themselves of the noble owner's proffered hospitality. The reception accorded to the Prince of Wales when he visited the Abbey was brilliant and imposing, and the Welbeck welkin rang with shouts of festivity such as had not been experienced for years before. The fine park was thrown open, and the public walked at will through the beautiful grounds, entering the hitherto sacred place with a wondering and astonished gaze. The

Abbey is associated with many traditions of festive splendour, and another era of hospitality seemed to have dawned. In 1732 the owner of Welbeck appears to have been indiscriminate in his hospitality, for about that period, on one of the roads near the Abbey, was placed this curious notice :—

> 'Whoso is hungry and liste to eate,
> Let him come to Welbeck to his meate ;
> And for a night and for a day,
> His horse shall have both corn and hay :
> And no man shall ask him when he goeth away.'

In 1619 James I., whilst the guest of Sir William Cavendish, was entertained there with great magnificence; and in 1633 the festivities in honour of the visit of Charles I. were so enticing that his Majesty came again to the Abbey in 1634, when there was 'such excessive feasting as had scarcely ever been known in England.' Charles, accompanied by the Queen, marvelled at the ardour of the reception, and the generosity of the host. 'The earl,' says one historian, 'sent for all the gentry of the country to wait upon their Majesties, and so liberal was he in his efforts to please his Royal guests, that £15,000 did not cover the expenditure.'

Following upon the visit of the Prince of Wales, a visit enjoyable to both guest and host, the Duke of Portland invited to his park the Honourable Artillery Company, with which he had been connected for some time in an honorary capacity, and for ten days the officers and men were encamped under the shadow of the Abbey, partaking of a right royal hospitality, and enjoying what was nothing less than a huge picnic in a huge park. The sham fights which were organised attracted thousands to the spot, and the Bank Holiday of 1882 was certainly unlike any corresponding period in the history of Welbeck. Quietness supervened, and up to the present time no extraordinary carousal has awakened the echoes of the forest, and the inhabitants of the Abbey are enjoying somewhat of that serene repose which marked their life during the career of the late Duke of Portland.

N. HARTLEY ASPDEN.

* * *

OLD NOTTINGHAMSHIRE.—Mr. J. Potter Briscoe, F.R.H.S., Librarian of the Nottingham Free Public Library, is preparing a second series of this work which will contain, *inter alia*, a paper on *Ancient Tree Markings in Sherwood Forest.* It is stated that the writer of the paper in question, Mr. J. G. Ogle, who has carefully studied the subject, will be able to disprove some statements of previous writers.

INSECT PREVENTION.

II.

ANOTHER crop attacker which entirely depends (as far as crops are concerned) for its winter home on finding a shelter *within* the stems ofcorn stubble, is the corn saw-fly, the *cephus pygmæus.* This is a small black and yellow four-winged fly, very like a thin-bodied, light-made wasp in shape, and it is to be found in great numbers in flowers in summer. The white maggot feeds within corn stalks, and having eaten its way upwards through the knots, travels down again to the lowest part of the stem, and there spins itself a case in which it passes the winter; and here, in spring or early summer, it turns to a *pupa*, from which the saw-fly comes out in time to set on foot a new attack on the growing crop. This is not a commonly injurious insect in this country, although sometimes very destructive on the Continent; but I have found the maggot in stubble in West Gloucestershire, and any treatment by which stubble can be collected and burnt will easily get rid of the threatened attack from within it. Burning the refuse straw of the gathered crop is also an excellent way of much lessening the amount of the destructive mustard-beetle of the Fen country. This beetle, like the turnip flea-beetle, hibernates, and spends the winter in any convenient shelter, from which it comes out to carry on its life work in the spring; and it is stated it will bear the most severe weather sheltered in the pipes of reeds near drains and ditches, and the beetles also secure themselves in the old mustard stems. Consequently, it would do great good to destroy this refuse, instead of saving it for rough roofing or other purposes; and getting rid of reeds, rushes, and rough grass, in the roots of which the mustard-beetles shelter, would also be highly desirable. These attacks are just mentioned to show that there are cases in which merely destroying rubbish, or what is of little value as manure, will act at once in lessening the amount of insect presence; but the point of crop pests sheltering for the winter amongst grass or corn roots brings us on to an attack of great importance generally, and of much interest here. I allude to that of the wheat midge. We know that this very small, yellow, gnat-like fly lays its eggs in corn ears when they are coming into blossom; and though these midge gnats are so small that they may be easily overlooked, excepting when they are out in numbers in the evening, yet the yellow or scarlet legless maggot which hatches from them may be fairly seen in the injured ears, and if we look at some of the peculiarities of the attack, which have not yet been much noticed in their practical bearing, I think we may get a clue towards some useful treatment. The wheat midge appears in June, and lays its eggs in the blossoming ears of wheat, also sometimes in those of rye, barley, and oats, and likewise (which is a very important addition), sometimes in those of twitch or couch grass, *triticum repens.* Here the maggots feed, and their presence may be known both by the injured grain and the ruffled state of the ears, caused by the birds searching them out, and when autumn comes, the 'red maggots,' as they are called, or a great part of them, are still in the ripened ear. A great number are carried off with the harvested crop, the further history of which we will return to presently, as it gives a very useful point or two; but in the natural course of things the maggots which have fed in the ears during the summer go down to the ground, or into the ground, in the autumn. We have a direct observation of this in the notes published by Mr. Bethune, President of the Entomological Society of Ontario, firstly in 1868, in the Canada *Farmer*, afterwards, by direction of the Legislative Assembly, in the Report of the Entomological Society of Ontario for 1871. He mentions receiving clay from a field in which the midge-infested wheat had been grown in the previous year. The date of receipt was before the middle of June, and the earth then contained a large number of wheat midge maggots, from which both male and female wheat midges presently hatched. This is a valuable note, as thus, besides what we see of stragglers on the stems and at the roots of the wheat, we have the information from a perfectly competent observer of the maggots being to be found *in the earth* of the field which was infested in the previous year. The fact of a very great number being carried off the field in the corn is outside any consideration of their habits, for if affairs had gone on in the natural train the corn would have fallen, and so would the maggots. We may get rid of those that are carted from the field (and it is eminently desirable to do so) by burning the dust, with the red maggots in it, which is often to be seen under the thrashing machines; but in days when thrashing was more often carried on by a flail than it is now, and also where chaff was customarily thrown to decay in any out-of-the-way nook, there was a very useful lesson thus to be learnt about the requirement of the maggot of a certain amount of damp. From those *damp overhung* chaff heaps there came crowds of wheat midge in the early summer of the following year, but *not* from all heaps of chaff. It was noticeable that where the chaff heaps were large, that is of a good many cartloads, and in a damp overhung spot, the midges hatched fairly or in great numbers, but where the heaps were small, that is of single sack-fulls, which had been brought me for experiment, and placed, though out of doors, yet not in an overhung place, there was not a midge to be seen. If we turn now to the Canadian and United States observations we find it noted that the wheat midge, in every stage of its life, is very sensitive of dryness and moisture. The midge, as we know, lays its eggs chiefly in the comparatively cool and damp evening hours, but further it is stated that damp and low-lying fields, marshy spots in fields, the neighbourhood of sheltering hedges and trees, all increase the amount of attack, as well as damp weather at laying time. I have not had opportunity for tracing this out myself, but in the observations I was favoured with from this place during this season, the midge was noticed as very prevalent in grass by hedges; and the great numbers found in clover, on land which was in wheat the preceding year, would have had a good sheltering leafage overhead. There seems no doubt that the maggot passes the winter close to its food plants, but the German observations make an important addition in adding couch grass to the number. This would give an additional reason for finding the midge here in wild grasses by hedges, though it was not present excepting casually in permanent pasture, and also it would account for stray attacks taking place where this noxious weed had not been properly rooted out. Now if we look at these various details I think there is enough to help us in some degree. The home of the red maggot in winter is by its food plant, and there it lies perfectly at the mercy of all measures of agricultural treatment which may throw it out, up or down, from its natural resting place. It has been advised to plough deeply enough to bury the maggot securely down, and this plan answers where the ground can be left undisturbed long enough to run no risk of bringing the maggots to the surface again. But the simple plan of breaking up the surface by some form of cultivator which would skim just deeply enough to allow the stubble and roots to be gathered together afterwards and burnt, would seem likely to clear a deal of the pest away. The maggots will lie for weeks, hard or motionless in drought, therefore if this plan was carried out in the hot dry weather which often occurs just at the time the corn is carried the creature would have much less chance of escape. The various dressings of hot lime, or gas lime, which are so exceedingly serviceable in checking insect pests, would have good play on the maggot before it had gone thoroughly down; and there is another method of treatment that I submit, though there may be agricultural reasons I do not know of against using it. Might not the standing stubble be fired? By adjusting the apparatus of the reaper so as to cut rather higher, there would be enough straw to let the flame run. Of course there is the loss of good straw, and the loss of the decayed stubble and some risk, but still in cases of bad attack one might hope by running the fire over the field to make such a thorough clearing of all insect pests that were on or near the surface, that the plan might be worth thinking of. The loss caused by this insect is a very serious matter in Britain, a loss which the estimates made here show us sometimes to amount to a sack per acre on seventy acres; sometimes and more frequently in the years noted, to a loss of about three sacks per acre. I have wished to draw attention to how, in the very different methods of life of different insects, there is often some one point of likeness in their habits, by which we may check their over-increase. In the various methods of life we are now considering, that point is *winter shelter*, and more particularly shelter sought at the roots, or down or amongst the stems of grass or stubble of various kinds. But there is yet one more of our bad farm pests which I wish to say a few words about, as it differs from all those that we have mentioned in its winter shelter, not being amongst the perishing remains of the harvested crop, but in the heart of the diseased growth which its presence causes in the winter corn or kindred grasses. This is the attack most commonly seen on barley, often known as 'gout,' from the swollen appearance of the sheathing leaves where the diseased ear has not been able to free itself. It is caused by a small, very thick-made, black or yellow, two-winged fly—known in Germany from its attack being on the haulm, as the haulm-fly—scientifically, as the *chlorops tæniopus*. This fly lays its egg at or near the base of the forming ear, and the maggot which hatches from this egg eats its way down to the first knot, forming thus a furrow in the stem which greatly interferes with its healthy growth. By this furrow you may know the attack of the haulm-fly. Its regular English name is the ribbon-footed corn-fly, but as without a magnifying glass its feet are hardly distinguishable, the German name of 'haulm' fly seems the best. The maggot usually turns to a chrysalis in the sheathing leaves, and the fly may sometimes be found in great numbers in stacks just after they have been built up. I have found these flies thus in vast numbers in barley in this county. Here we have a kind of fly which comes out of the attacked corn in autumn, when it is plain beyond all doubt that there is not a coming-on crop in half or three-quarter grown state with the ear just formed for it to go to lay its egg in. The question has sometimes been, What became of it until laying time next year? But we are told from Continental observations that there is an intermediate winter brood. It appears that the autumn-bred fly lays its eggs on autumn-sown corn or on grass. The maggot pierces into the neck of the plant, and there it winters. In spring the shoot which contains the maggot grows in a thickened form and with wide leaves, and within it the haulm-fly goes through its changes, and from the (commonly) destroyed shoot it comes out to start its summer attack.

I have not seen this form of attack, but it is given on trustworthy authority. In cases like this our best remedy seems to lie in having the ground and the surroundings in such a state as will not suit the attackers. The haulm-fly attack, so far as I have seen, is worst in damp and ill-drained parts of fields, and also near hedges with neglected grass headlands by them, and these neglected grass bands, which appear most fruitful nurseries of wireworm and daddy-long-legs, of wheat midge and haulm-fly, and probably of many other corn pests, would be all the better for careful consideration. I will ask your patience now just for a little longer to class these attacks in some order. We have seen some attacks start from broken-up pasture and clover ley. Here the ground is empty, and we may do what we will, and we can do a great deal to fairly stamp out the pest before we put the new crop in. Wireworm and daddy-long-legs are of this kind. Some are sheltered in stubble, straw, haulm, roots, and all kinds of perishing rubbish: we may in many cases get rid of these shelters and the inhabitants in them. Turnip flea-beetle, mustard-beetle, corn sawfly, and others are of this sort, and often the wheat midge. Some are in stubble, and also live during winter in grub state, feeding at the roots of clover, amongst the stubble; and here at present there seems no better treatment than dressings which may make the ground thoroughly obnoxious to insects, such as the weevils, and also be good for the attacked crop. But here we need much more information as to practical measures that may be serviceable. A fourth kind live in the heart of the growing plant. Such are the haulm-fly, and wheat-bulb-fly, and in these cases draining, manuring, and removing such grasses as shelter the attack seem to be our best help. But in all these cases *something* may be done. The details must vary with soil and situation, but I have endeavoured to point out the principle of action; and if, as I fear, I may have seemed to venture beyond my office in mention of agricultural measures, I must beg you to consider that I only name them as examples of treatment that will act on the attacks, but that it is in submission to your far better judgment as to how they had best be applied.

Eleanor A. Ormerod.

* * *

'Food and Feeding.'—We have received from Messrs. Frederick Warne and Co. the third edition, considerably enlarged, of Sir Henry Thompson's most valuable and useful little book on 'Food and Feeding.' The whole subject is treated exhaustively. We have chapters on the selection and preparation of food, on the various kinds of food, on meals, on drinks with meals, on dining out, and on a host of other things relating to 'feeding' in all its aspects. We commend the book to all who have not seen it, for who is not interested in food and feeding?

FOREST BOTANY IN NORWAY.

II.

IN the narrative of what I saw in passing through Norway (given in ‘Forestry,’ vol. ii., p. 316), I have intimated that close upon the level of the sea, on the shores of the Skager-Rack, and on islands there, and the coast of Bohn's Bay, and of the Christiana Fjord, the coniferæ give a character to the scenery. But, as has been stated, these are not the only kind of trees found indigenous in Norway. There has been given on no mean authority a statement to the effect that, in the country, journeying from north to south, and in some parts of the country in descending from a great elevation to the valley or plain, we pass through successive zones, which have been characterized as the zone of perpetual snow, where only a few ice plants, lichens and mosses grow; the zone of the Willow and Birch; the zone of the Pine and Fir; the zone of the Oak; the zone of the Beech; and the zone of the cultivated fields. The statement may be useful as a memorandum; but, if great stress be put upon it, it may break down. I have only found it true to the extent that there are Birch woods, or forests, reaching further north than a forest of Pine or Fir, though trees of these may be found in the same latitude; and that Willows are found in higher latitudes than these; and that there are forests of Fir and Pine further north than Oaks; and Oaks further north than Beeches; and Beeches growing further north and at higher elevation than general cultivation has extended. But beyond an indication of these facts, I think the statement cited may mislead.

To the northernmost zone is assigned, as a character, its production of the Birch, *Betula odorata*, Bechet. It flourishes throughout the whole country; but it is in West Finmark that it appears forming veritable forests; elsewhere it is found as a tree which delights in the light, very frequently dispersed over clearings in Pine and Fir forests, and besides, on lands completely cleared of woods. The altitudinal limits of this tree are in southern Norway about 1,100 metres; in the diocese of Drontheim from 600 to 700 metres; in Finmark from 300 to 400 metres, above the level of the sea. The Birch is often in Norway a tree of fine growth. It is not rare to meet with Birches from 20 to 25 metres, 67 to 84 feet, in height, and 1·5 metres, 5 feet, diameter at the ground. The crown may stretch on all sides more than 10 metres, or 43 feet, from the trunk. Besides the wood being used in carpentry, and as firewood, the external white bark is employed in the manufacture of a great many articles, and for roofing, being then covered with earth or turf.

The Birch often takes an elegant form with the exterior branches pendant in long clusters measuring as much as 5 metres, 17 feet.

The Birch may attain to a great age. This tree, and especially the form with long pendant branches, is the ornament of the valleys of Norway; certain specimens in isolated groups having acquired by their beauty a widespread fame, and are protected not only by the proprietors, but by the whole population of the valley, who are proud of them. They have generally particular surnames, borrowed ordinarily from the property to which they belong; one famous specimen is the *Holsbirk*, so called from the name of the estate, Hol, Rennebu, in Orkedal, in the prefect of Soddre-Drontheim, 62° 58′ N.

The Willow of Norway, *Salix caprea*, known in Britain as the Great Round-leaved Willow, is very much diffused over the forest regions of Norway, and even beyond the elevation above the level of the sea attained by the Fir and the Pine; and, as intimated, it may be seen to flourish in higher latitudes, or at least as far north as either of these trees. It grows at Hammerfest, 70° 37′ N., but only as a shrub or brush, and the allied tree, the Aspen, *Populus tremula*, is likewise spread over the whole of Norway. In the south part of the country it may be met with, but in dwarfed condition, at an altitude of 900 metres above the level of the sea. In the lower-lying country it attains a height of 30 metres, and even at Alten, 70° N., in Finmark, it may attain to 18 metres, 60 feet. Of Osiers, there are in Norway about 20 wild species, the greater part of them taking the form of bushes. They grow to a great elevation on the mountains, principally on moist slopes. In southern Norway, on spots a little sheltered, they may be found 1,500 metres above the sea level.

To the same zone may be traced the growth of the Alder, *Alnus incana*, D. C., known in England as the Hoary-beard Alder. It is met with very frequently so far north as West Finmark, where it may be seen with a height of 20 metres, 66 feet 8 inches, and a diameter of 30 centimetres at the level of the ground; and it grows to almost the same altitude as the Beech.

The *Alnus glutinosa*, Gent., the common Alder of Britain, is much less frequently met with. It flourishes always in low valleys along the banks of streams and in humid soil. It is scarcely to be met with above an altitude of from 250 to 300 metres, and its Polar limit is 64° N. lat.

Of the Oak, two species are found growing wild in Norway, the sessile Fruited Oak, *Quercus robur*, W., and the Common Oak, *Q. pedunculata*, W. The latter is found on the west coast up to 63° N.; but the planted Oak up to 66° N. In the southern parts of the country it scarcely ever extends beyond 300 metres above the level of the sea. There are small forests of the Common

Oak on the coast between Arendal and Flekkefjord, on the shore of the diocese of Bergen and in Romsdal.

The Beech, *Fagus sylvatica*, L., when planted, flourishes up to Stegen in Nordland, 67° 56′ N.; and at Drontheim, 63° 26′ N., its seeds come to maturity. As a wild tree, it is not met with beyond 61° N. Even in the southern parts of the country it does not extend beyond 250 metres above the level of the sea. It forms small forests near Tonsberg, near Larvik, near Arendal, and a little north of Bergen, at Sæim, an annex of Harshanger, 60° 35′ N. At this point is found the most northern forest of wild Beeches in the world.

The Elm, *Ulmus montana*, S., the Wych Elm of Britain, is met with up to the 67° of north latitude. Its limit of elevation is generally from 500 to 600 metres above the level of the sea. At Solvorn, near one of the branches in the interior of the Seguefjord, it forms quite exceptionally a little forest; elsewhere it is met with in small clumps or growing solitarily. It may attain to 32 metres in height. In Finmark, at Alten, 70° N., Elms are met with which have attained to 8 metres, 27 feet, in height, and 40 centimetres, 16 inches, in diameter.

The Ash, *Fraxinus excelsior*, L., is found growing wild up to Molde, in Romsdal, 62° 44′ N.; but planted, it grows very much further north, and it ripens its seeds even within the Arctic circle. In the south of Norway it flourishes up to 500 metres of altitude, and may attain a height of 30 metres, 100 feet; while here and there may be seen trunks which at 40 inches above the ground have a diameter of from 1·5 to 1·8 metres, from 5 feet to 6 feet.

The Lime, *Tilia parvifolia*, Ehrh., known in Britain by the designation the Small-leaved Limetree, extends in the east of Norway to 61° N.; but on the west coast to 62° N. It affects principally low-lying countries; but isolated trees may be found up to 500 metres above the level of the sea. Planted, it grows up to 64° N., and even up to Stegen, in Nordland.

The Maple, *Acer platanoides*, L., known in Britain as the Norway Maple, extends in Eastern Norway, in Sondre, Gudbrandsdal, to 61° 25′ N., and to an altitude of 260 metres above the level of the sea, though in the south it scarcely extends above 300 metres. Planted, it is found to the top of the Ramenfjord, in Nordland, 66° 18′ N.

The Hazel, *Corylus avellana*, L., is met with pretty frequently in a wild state on the low-lying lands to the south of the Drontheimfjord. Further to the north it becomes more rare. It is met with, however, up to Stegen in Nordland, 67° 56′ N., where its fruit still ripens. In the south of Norway it grows to an elevation of 500 metres above the level of the sea.

The Mountain Ash, *Sorbus aucuparia*, L., *Pyrus aucuparia*, Gaerton, is very frequently met with everywhere in Norway, and in ordinary summer its fruit comes to maturity. On mountains it extends to the limits of the Birch, when it stops. With its branches of red berries, which offer a food greatly sought after by birds in great numbers it gives to the mountain slopes in winter a peculiar and animated appearance.

In supplying such details, we are drifting away from the consideration of what are generally known as forest trees to what are generally known as wild fruits; and why not? With these may be mentioned several others.

The Crab Apple, *Pyrus malus*, L., is met with here and there in a wild state up to the island of Yteros, in the Drontheimfjord, 63°49′ N.; in the south it does not extend above 500 metres of altitude.

The Gean, or Wild Cherry, *Prunus avium* is met with in the interior of the Sognefjord, at Urnæs, where there is a small wood of it, 12 metres or 40 feet high, and 50 centimetres, or 20 inches thick.

The Bird-Cherry, *Prunus padus*, L., is generally diffused throughout the whole of Norway, even to the Tanaelv, in Ost Finmark. 70°20′ N., its fruit ripens. In South Norway it attains the altitude attained by the Pine, and sometimes it extends to a higher elevation.

The Blackthorn, or Sloe, *Prunos spinosa*, L., is found in South Norway, up to 60° N.

The Barberry, *Berberis vulgaris*, L., shows itself in a sub-spontaneous state in many places up to 64° N.

The Gooseberry, *Ribes grossularia*, L., is found here and there in a sub-spontaneous state in low-lying countries up to 63° N.

The Red Currant, *Ribes rubrum* L., is found pretty generally spread over the whole country up to the eastern frontier of Finmark, and on mountains it grows beyond the limits of the Pine.

The Juniper, *Juniperus communis*, L., generally presents itself as a bush, in shrub form, and from 3 feet to 6 feet 6 inches in height; but in certain plains up to Selbo, in the prefecture of Sondre Drontheim, it assumes a fine conical form, and the proportions of a tree, and it attains to a height of 12 metres, or 40 feet. It is found everywhere up to the North Cape. It climbs up the mountains, passing the limits of the Birch, and attains, like some of the Osiers, an altitude of 1,500 metres above the level of the sea.

The following are the various times of the flowering of trees and arborescent shrubs reared in the environs of Christiana, 59° 55′ N.E. of Greenwich :—

Alnus incana, J. C.	April	6-10
Corylus avellana, L.	,,	6-10
Salix caprea, L.	,,	22-30
Ulmus montana, L.	May	4- 8
Betula glutinosa, Wallr.	,,	14-18
Acer platanoides, L.	,,	14-18
Larix europæa, C.	,,	20-24
Quercus pedunculata	,,	24-30
Pinus sylvestris, L.	,,	24-30
Abies excelsior, D.C.	,,	24-31
Fraxinus excelsior, L.	June	1- 4
Æsculus hippocastanum, L.	,,	1- 4
Sorbus aucuparia, L.	,,	2- 6
—— *hybrida*, L.	,,	4- 8
Syringa vulgaris, L.	June	2- 6
—— *chinausis*, Willd	,,	10-14
Juniperus communis, L.	,,	4- 8
Cratægus, sanguin. Pall.	,,	4- 8
——— *acantha*, L.	,,	14-18
Rhamnus catharticus, L.	,,	8-12
——— *frangula*, L.	,,	8-12
Cytisus alpinus, Mell.	,,	14-18
Rosa canina, L.	,,	18-22
—— *rubiginosa*, L.	,,	26-30
Robinea pseudo-acacia	,,	26-30
Sambucus nigra, L	July	1- 4
Ligustrum vulgare, L.	,,	4- 8
Tilia parvifolia, Ehrn	,,	8-12

JOHN C. BROWN.

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NURSERIES AT LES VAUX, NEAR SALBRIS, LOIR-ET-CHER.—Mr. David Cannon, in conjunction with Mr. E. J. C. Brace, both of whom have sent numerous and interesting contributions to 'FORESTRY,' have recently established on the property of Les Vaux, Salbris, Loir-et-Cher, France (where they have already gained the highest prize for sylviculture in the district), extensive nurseries for the propagation of all hardy forest trees and shrubs. They state that 'having observed that a weakly condition, in plants, is generally the result of over-crowding, they make it a rule to sow thinly and give the young plants plenty of room, so that their seedlings, well furnished with fibrous roots, may be fit to transplant with perfect safety. Grown in a light gravelly soil, in an exposed situation, and under a variable and rigorous climate, these plants are especially hardy.' They have also undertaken the growing of strawberry plants and choice varieties of potatoes. We wish their venture all success.

THE ROYAL OAK OF BOSCOBEL.

IN 'Chips and Slips' of the December number of 'FORESTRY,' a contributor, writing on the above mentioned subject, says 'it is only one grown from an acorn of the celebrated tree that afforded the fugitive king shelter,' &c. There is a difference of opinion on this point, and in the neighbourhood of the tree, opinion is against the theory in question.

There are several old men here who have lived and worked besid the tree since they were lads who affirm that they know no difference between its size now and when they first saw it.

One farmer who has seen it almost daily for the last eleven years is of opinion that it gets to look worse all the while; nay, more we have the Earl of Bradford, who is a keen observer of trees, saying that he remembers this tree for the last fifty years, and knows no difference in it; and he has heard his father say that it had been handed down from father to son for several generations as the veritable tree in which the king took shelter.

I have measured the tree, and compared it with others that have been cut down within half a mile of Hubbal Grange, which were probably trees of the same forest, and which looked about the same size and age. They had two hundred and fifteen concentric rings of years of growth. Some of these trees had the dead tops (or stag head) cut off them over thirty years ago, showing that they had been at maturity many years before that: an Oak tree does not reach maturity much before three hundred years, although it may stand alive for one hundred years maturing its timber without adding any thing perceptible to its size. Under these circumstances, and at the lowest calculation, the tree now enclosed at Boscobel cannot be far short of four hundred years old; and it looks all that age.

I have read many accounts of the tree, written by different people at different periods, from Lord Clarendon's 'History of the Rebellion' down to those of later years; and it is singular that no two of them give the same description of the tree; and some of them are so sensational about owls, hollow tree, and troopers, that they show their descriptions to be mere imagination, for the sake of making it readable. One describes it as a large Oak with spreading top about the year 1660, pent up, and enclosed with a high pole fence. Another writer says it was blown down by a storm in 1700; another writer speaks of it as a fair spreading tree in 1703, and in 1713 enclosed with a brick wall; another, after remarking on the tree enclosed with a brick wall, says, near to it grows a young sapling from one of its acorns; another writer suggests that the Oak now shown must be the sapling referred to by only this one writer. But a large Oak tree is not going to vanish in that way, after having been protected and almost held sacred by the whole community, without some record being left of how it had been disposed of, and the high price it had brought, &c., for certainly there would have been a great competition to secure such a relic of the past. It is more likely that the small sapling was removed when the wall was rebuilt, if ever there was one. Other writers speak of the boughs having been cut and broken off, and the trunk hacked by visitors to get something of it to carry away, and this is just the appearance the tree has. There have been a great many branches cut off, and healed over, making the surface of the trunk uneven, and therefore difficult to make the measuring of the circumference of the tree agree even when taken twice by the same person, as half an inch up or down will alter the girth considerably; and in the trunk near the ground, there is a hole covered over with a large sheet of lead to preserve it from decay and from being further cut and destroyed. I have been up in the tree, and at twenty-one feet from the ground any one could sit with tolerable comfort and security, and when the under boughs were on it would be easy of access, and persons in the tree would not be easily seen. James Craig.

HARVESTING IN THE STACK.

THIS invention consists in a means of drying and harvesting hay or other crops in a green or partially green condition, by stacking the crop in sections or sub-divisions, so that no large quantity is brought into contact, while a current of air can pass freely under, over, and upon all sides of each individual section. By this system hay may be taken into a stack, even with a heavy crop, by once turning over the swathe, and without the labour of tedding or spreading over the ground, and good hay may be insured in all weather without danger of overheating, or of the hay getting mildewed. To effect this, a light iron frame is constructed.

The standards are made of T irons, bolted together, having cast iron brackets at suitable intervals securely fixed to them, and upon these projecting brackets, angle irons, the width of the intended stack, are laid. These are notched, at distances of about one foot apart, to receive galvanised iron wires, and upon the open work divisions, so made, the hay is laid. The wires are held in their places by having attached to each end lead knobs, which prevent them from being pulled through the notches by the weight of the hay; but they can be released by pushing the knobs upwards, and the wires can then be drawn out of the stack. The four standards terminate in iron spikes for fixing into the ground, and on the top iron pins are attached upon which a wooden or iron frame is placed, of the size of the stack. In the centre of this frame an upright iron rest takes a pole, over which a rick-cloth is thrown.

When the crop is ready to be stacked, the frame is easily erected. The standards are placed in the ground a little outside the four corners of the intended stack, and the wooden frame placed on the top, by which the standards are kept upright and in place. A straddle of boughs should be placed in the ordinary way as a foundation, upon which the stack will ultimately rest. A pair of angle irons are then laid upon the lowest brackets and the wire placed in position. The first layer of hay is now laid till the level of the next pair of brackets is reached, a second set of wires is then placed, and so on to the top of the stack.

Each section will, as the hay dries and occupies less space, settle away from the one above it, and thus allow the passage of a free current of air through the whole stack.

When the stack is finished the rick-cloth is put on.

The hay should remain in the frame till all superfluous moisture is drawn out of it (probably for about three weeks), when the frame may be taken down to make a second stack. To do this, the wires of the bottom section are first released by pushing up the knobs and drawing out the wires, when the hay will fall upon the straddle. In like manner the next section, and so on to the top, when the angle irons can be lifted down and the standards removed. The rick will then be ready for thatching.

Two or more ricks may be made with one frame in the same season.

It is believed that this system of harvesting crops in the stack will be very largely adopted, owing to the great difficulty in bad seasons experienced in the ordinary method; and the recent trials have shown that if hay or any other crop is put into a rick in too green a condition, the over-heating and other evils resulting therefrom cannot be overcome, as it was hoped might be the case, by the use of exhaust fans or similar means. The attention, therefore, of agriculturists is invited to the system now advocated as a practical solution of the question.

The first cost of the apparatus is a small item; a frame, with all appliances, for stacking 10 tons of hay, costing from £12 to £18, and other sizes in proportion. One such frame will make two or more stacks in one season, and being all constructed of iron will last for many years. It is very light and portable, weighing complete, for 10 ton size, under 20 cwt. It is also easily and quickly erected, and requires no skilled labour in using it.

The great saving of labour in putting the hay direct from the mowing machine into the stack is obvious.

Agriculturists wishing to make a trial of this invention for the forthcoming season should make application to Mr. Thomas R. Kydd, 'Griff' Brick, Tile, Agricultural and Sanitary Pipe Works, Nuneaton, Warwickshire, or to the patentee, Mr. E. R. Salwey, Ifield Court, Gravesend, Kent, by whom any further information will be furnished.

Manufacturers desiring to make arrangements for the supply of the apparatus should forward their applications to the same address, where we understand working drawings may be obtained.

* * *

TREES AND SHRUBS FOR TOWNS AND SUBURBS.

AT a meeting of the Local Branch of the Arboricultural Society of England, held at the Alliance Hotel, Charlotte Square, Newcastle-on-Tyne, on Saturday, February 16th, Mr. John Wardle, Newton Hall, Stocksfield-on-Tyne, read an interesting paper on 'Trees and Shrubs suitable for Towns and Suburbs.' Mr. Balfour, Newcastle, occupied the chair, and there was a large attendance. Mr. Wardle, in the course of his paper, said his remarks were more intended as a guide to amateurs than as information for his professional brethren. It was when walking through towns and suburbs and noticing the unsuitableness of many of the trees and shrubs planted that the idea of such a paper occurred to him. The great point to be kept in view was to maintain the soil as rich as possible, so that energy might be given to the trees and shrubs to battle against the dangerous influences they had to contend with. The time when they received most harm was when the trees had just burst into foliage, and when a long season of dry weather allowed the smoke and dust to choke up the pores. In such a case the use of syringe a or hose would be of great service; but this he was afraid would be too laborious to carry out on a large scale, and must be confined to small gardens. If they looked at tree-planting in towns from a sanitary point of view, every available space ought to be utilised. It would be desirable for our Corporation in forming new streets to make provision for rows of trees, after the style of the Boulevards in Paris, for it is well known that trees give off a large quantity of life-giving gas. In preparing the soil for street planting they ought to have three or four cartloads of turf loam mixed with half-inch bones and rotten manure to each tree, in order to give them a good start. Further he thought that if all the different varieties of trees and shrubs in the public parks had their proper names exposed so that people might become acquainted with their different habits, it would be a great boon to those whose knowledge in this direction was deficient, and cause the frequenters of the parks to take greater interest in arboriculture, Mr. Wardle then went on to mention the Austrian Pine, the Silkworm tree, the Lime tree, the American Lime, the Maple, the Sycamore, the Elm, the Poplar, the Willow, the Birch, the Acacia, the Holly, the Lilac, the Mock Orange, the Forsythia, the Elder, and other hardy varieties, as the most likely to grow well amid the smoke and dust and other influences so injurious to plant life in towns. The Chairman said the paper they had listened to had been most interesting and instructive, and, no doubt, had caused Mr. Wardle a great deal of time and trouble. He did not agree in all the selections of trees Mr. Wardle had made. It was just the hardiest which would grow within three miles of the town, and even those were stunted. Some would grow in large, smoky towns, but not where there were sulphurous works. He only wished the Parks Committee had been present to listen to the paper, for the knowledge they would have got would have saved the ratepayers some hundreds of pounds. The trees in the parks were planted indiscreetly and indiscriminately; they planted the same trees in Newcastle as they would at Newton Hall. The parties who ordered the trees for the parks seemed to know very little about the business. The Secretary (Mr. Davidson, Haydon Bridge) proposed a vote of thanks to Mr. Wardle for his paper. It was fortunate that the paper should be read in Newcastle just when the sanitary question was before the people. Mr. Baldon, Dilston, seconded the vote of thanks. There was no doubt a great deal of matter in the paper open to discussion, but at the same time there was a great deal of truth in many of the remarks made by Mr. Wardle, especially in regard to the planting of trees and shrubs in town. It was a matter which had never before been thoroughly taken up; and he thought it might be worth while for the Society to bring forward the question of the town culture of trees from a sanitary point of view. Newcastle was a town in which very few trees would grow luxuriantly. We had a large amount of sulphuric acid from the works, and the cultivation of plants in such a town required special attention. The motion was carried by acclamation. Mr. Wardle, in acknowledging the compliment, said his remarks had been made with a view of getting our villa gardens to have a more respectable appearance, and also to the sanitary improvement of the town. A vote of thanks to the Chairman closed the meeting.

ENGLAND.

THE weather during this month is very uncertain, but often results in alternate showers and sunshine, with occasional sudden changes of temperature following a genially warm day by a sharp nip of frost at night. The average rainfall is about $1\frac{3}{4}$ inches, and the evaporation about $2\frac{1}{2}$ inches. Last year the rainfall registered at Greenwich was 1·69 inches, while at Chewton Priory, on Mendip, it was only ·96-inch, both below the average of the preceding ten years.

Orchard.—Examine recently-planted fruit trees, and in cases where they have loosened by the winds, stir the surface lightly and work the soil close to the stem. Desist from cutting off large branches at this season, as such an operation would be highly prejudicial to the health of the tree.

Fences.—Planting live fences of every kind should be completed by this time; but where some of this work has still to be done, extra care is necessary to ensure anything like success, and copious watering may be necessary after planting. Hoe and clear weeds from all young hedges, and do the same as often as necessary during the summer. The absence of weeds admits a free circulation of air, and frequent stirring of the soil accelerates the growth of the plants.

Woods.—Forest planting should also be finished by this time. Examine newly-formed plantations, and set up loose plants, trampling the earth firmly around them to maintain them in an upright position.

Clear away loose hanging or broken branches from trees in woods and plantations, and clear off brushwood from the roads and rides, and from amongst the stools in coppice woods. Finish grafting forest trees, and repair defects in clay of previous grafts. Earth up the lines of dwarf grafts, leaving the scion only above ground. Finish the trimming of evergreen shrubs and hedges, and cut or trim up ivy on walls. The new foliage will in a short time hide the bare appearance of this operation.

NURSERY.—Finish transplanting as early as possible, and sow all sorts of coniferæ seeds. Protect the seed beds from birds by some sort of covering of branches, straw, rushes, ferns, or nets. If the latter is used the seeds require a heavier covering of earth than when the beds are covered by a closer protecting medium. Weed all seed beds, and dig the alleys. Dig between the rows of trees, and keep the ground clear of weeds. Protect young nursery stock from frosts by twigs of Spruce, Laurel, or something of a similar kind, stuck into the beds, not to cover the plants, but to shade them from the sunshine that follows the frosts.

OAK BARKING will probably begin early this season after such a mild winter as we have just passed through. All other work should be pushed forward, and everything got ready to take advantage of the early season, and commence operations as soon as the bark will run. Tanners prefer the bark stripped early in the season.

A. PATERSON.

Hunstrete, Pensford, Bristol.

SCOTLAND.

IF the present season has a claim to be remembered as being comparatively free from frost and snow, it has also for the frequency and severity of its gales. Another hurricane from the south-west was experienced in the early hours of Thursday, the 21st of February. It was, however, of short duration; but while it lasted was extremely violent, and I think may be put down as the most severe gale that has passed over this district for at least sixteen years. Although, so far as I know, there has been no destruction to forests anything approaching to what was reported from the south the previous month, there has nevertheless been a great many trees in the more exposed situations broken and blown down. Here there are more than at any time within the period referred to. There has, however, been no damage of a serious character. The weather of the past month in some parts of the country was less favourable for planting operations than that of the previous months of the season, a considerable depth of snow having fallen, with occasional sharp frosts. Planting of all sorts of forest trees should now be completed as soon as possible, care being exercised in keeping the roots protected from drying winds. Look over plantations of large plants formed earlier in the season, and firm up those knocked out of position by the recent storms. See to the erection and repairs of fences bounding pasture lands. Where heavy stock are grazed the introduction of a 'barbed' wire, secured from the top, or indeed, the two upper wires, will be found to be a great protection to the fence. It is now much used in this locality by farmers and others, and has been found very serviceable in the way indicated. I have heard of no case of injury to stock arising from its use. The only danger in connection with it is in the event of one animal forcing another up against the fence, and in its endeavour to escape alongside the same, is apt to get somewhat scratched.

The work of the nursery should now be pushed forward. Finish the lining in and transplanting of all deciduous plants and the larger evergreens, and follow up with seedling Firs. Dig and prepare ground for coniferous seeds, and sow about the last days of the month if the ground is in a good state, or early in May as the weather permits. Dig between the rows of plants, undisturbed during the season, so as to destroy weeds and promote the growth of fibrous roots. Weed seed beds of last year, dig the alleys, and tidy up the nursery generally.

Complete the trimming of evergreen shrubs, hedges, and box edging.

Repair forest roads, &c., cut up by the winter's work, and clear out the side drains.

Towards the end of the month see to all necessary preparations for Oak barking, so that there may be no delay in starting whenever the bark will rise freely. Early barking is preferable, and in the interests of all parties concerned. This is a branch of forest work which for many years was the source of a very considerable revenue; but it is now fast becoming unremunerative. In those localities where the timber will realise a better price when felled in the dead season, it might, in my opinion, be almost as well to discontinue it.

Here we can yet work it profitably when done pretty extensively. It is, however, at the loss of some of our old customers, who now object to take the timber felled in the growing season.

Darnaway, N.B. D. SCOTT.

IRELAND.

The work of planting forest trees will now be virtually over for the season, and the foresters should go carefully over recently transplanted trees and see that they are all erect, firming in the ground any which may have got wind-tossed. In exposed situations the late severe gales may have affected the perpendicular of very lately planted trees, but if corrected in time the effect will have no permanent evil result.

All coppice woods should be gone over and regulated, the number of shoots on each stock thinned out, and such as are left for the crop pruned.

General thinning of plantations will for the present be mostly completed. All the lop and top should also be collected into heaps, sold or removed from the wood.

All preparations necessary should be made for Oak stripping, which will commence toward the end of the month. Without going over all the detail of this very important operation, it will suffice to say that the early bark is the best, when properly harvested. Saving bark is such a precarious work with our late moist seasons that the forester undertaking stripping should have nothing to interfere with him during the operation.

Ballinacourte, Tipperary. D. Sym Scott.

WALES.

Although the winter has been one of the most open we have had for many years, the cold east winds during the last month have kept vegetation in check. Under the circumstances planting will in most cases have been finished up. However, where such is not the case, no time should be lost in bringing such operations to a close. Planting at this late season, especially on light or thin soils, is not to be recommended. Evergreen trees and shrubs may be successfully planted during the present month; but they should be carefully removed with good balls of earth attached to their roots. Watering will be indispensable for plants removed at this season of the year, and when of large size they will require to be staked and protected against wind. Look round [all plantation of present year planting and see that all plants are standing upright. Any that may have been swayed by the wind, or loose about the roots, should be firmed, and any cavity round the collar filled in with soil.

Young plantations may be advantageously thinned during the present month.

With favourable weather Oak bark stripping will have to be commenced during the present month. As soon as the sap has risen sufficiently for the bark to run, no time should be lost in proceeding with the work. Under the circumstances all other work should be got into as forward a state as possible prior to peeling.

Where there is little bark stripping on hand, the preparation of ground for next season's planting may be proceeded with—such as fencing, clearing, draining, as well as other estate improvements.

Look round fences and have all put in repair prior to the turning of stock to the pastures. Finish up all transplanting in the nursery, and dig or fork between plants that were not removed last year.

Grass lawns and pleasure grounds will now require regular and careful attention, by rolling, mowing, clearing, &c.

Kinmel Park. LEWIS BAYNE.

WHY PRAIRIES ARE TREELESS.—Mr. Thomas Meehan believes that we have nearly reached the solution of the cause of the absence of trees from the priaries. It is not climatic, for timber belts flourish in all the prairie regions. It is not in conditions of soil, for the prairie soil is the most favourable to the germination of seeds, of trees as well as of other plants, and artificial plantations are remarkably successful wherever they are made. The real cause is probably to be found in the annual fires which have swept over the prairies from time immemorial, killing the young trees before they can grow large enough to resist the heat. The seeds of the annual plants of the prairie vegetation, maturing every year, are shed, and find protection before the fires come; the young trees, on the other hand, bear no seed and leave no resource for a succession after they are burned. This theory is supported by the fact that an abundant growth of trees has set in wherever the fires have been stopped. The fires were made by the aborigines for centuries before the white men came, possibly for the express purpose, Mr. Meehan suggests, of preventing the growth of trees and preserving the buffalo pastures. The question remains how the prairies first came to be naked. They probably formed the bottoms of the lakes and marshes that were left after the retreat of the glaciers, and continued wet after the highlands were covered with trees. Man followed the glaciers so closely that he anticipated the trees on these spots, and having learned already in southern latitudes the value of burning them, began before the trees gained a foothold.—*American Manufacturer and Builder.*

TREES FOR A DAMP SITUATION.—It often happens that there is a damp position in a garden in which it is desired to form a kind of shrubbery or block of trees, and a selection of such as are best fitted for the situation is required. Scarcely any tree would grow so quickly under these conditions as the Black Italian Poplar. The White Poplar (*Populus alba*) would also succeed. Willows grow well, and the weeping kind planted towards the margin of the clump has a pleasing appearance. The Hemlock Spruce (*Abies canadensis*) would probably flourish. For undergrowth the Alder grows quickly, while Mahonias, Japanese Privet, Snowberries, and Tamarisk would make satisfactory progress.

EDITOR'S BOX.

PLANTING OF GRASSY SURFACES.

SIR,—It seems to be acceded to in the antagonistic opinions of your several correspondents in the recent controversy concerning the paring of grassy surfaces previous to planting, that grass does not grow rank in elevated zones—to which I willingly assent. But then the question arises, in what place and in what soil does grass begin to assume the semblance of rankness? And the simple answer to this question, I think, is: In low latitudes, in genial climates, and in moderately deep and encouraging soils. To be sure, we have seen beautiful and luxuriant grasses growing far up the hillsides, and even green and fairly good pasture to the summit; and this is so, not alone in isolated, but in many parts common to all the country. Nevertheless one or more of the conditions aforementioned are indispensable to that end.

Mr. Scott's answer to 'Bannockburn's' demurrer with respect to the paring of grassy surfaces prior to planting such surfaces, is not, so far as the evidence adduced, convincing of its necessity. Still, he maintains that erasure of the grassy turf is a necessity to the well-being of the plant, and that the expense incurred at the time by so doing is more than reimbursed by the result ulteriorly. Besides his own opinions—opinions which I greatly and most sincerely respect, and can generally accept them without hesitation as authentic—he moreover quotes from actual official examination to strengthen and corroborate his opinions, for, says he, 'Very recently I had occasion to pass over a considerable extent of ground, planted a year or two ago, where neither paring nor pitting had been resorted to, . . . and what was the result? It is that . . . a large proportion of the plants are dead; some do exist, and barely so.'

Perhaps it may not be deemed bigoted to insinuate that, in such a case, wherein the result is so disastrous, might not the plants used to begin with have been too weak and small to cope efficiently against a strong growth of grassy vegetation? or, if stronger and larger plants had been used, might not the result have been different?

I can agree with Mr. Scott about the clearing of the moss from the spot where the tree is to be planted, if by that he means the green and quick moss of the disc, which moss is often found very troublesome to planters. But immediately beneath the surface-moss another kind of moss is sometimes found, which is not much superior to the outer moss, and at best can only be termed a sort of crude, or green peat, or peat in the initial stage of carbonization. Wherever such moss is, I have found it most difficult to induce trees to grow; in fact, no very small tree will grow therein.

In what further I have to say, past experience compels me to take the side of 'Bannockburn' on the negative side of this question, although I do not do so exactly for the same reasons as he.

What I assert is, that it is quite unnecessary to remove the grassy turf before planting the tree-plant; and that I have proved to be so by experiment and the sequent simple line of procedure. A few years ago I was planting a large area of very grassy land, and having had full freedom to experiment, and at the same time being eager to inform myself as to the best and cheapest mode of planting such land, I made the succeeding confined but sufficient test. After having measured off three equal portions of ground, equally inclined to produce exuberance of grass, this ground was subsequently planted in the following manner:—

(*a*) One portion (planted) with choice two-years' seedling, one-year transplanted Scotch Fir, and one-year transplanted Larch, mixed with Austrian and Corsican Pines of equivalent size; and these trees were, after being planted, left to struggle away as they best could among an abundant growth of grass. At the end of the year, on investigation it was disclosed that something like two-fifths of the plants had succumbed through being strangled and choked by weedy overgrowth, mostly grass; but the death-rate was not evenly distributed—that is, upon open and free soil deaths were less frequent than upon stiff and tenacious soil. In the one instance the sole deterrent to the existence of the tree was the weedy herbage; in the other there was, besides the weedy herbage, something in the soil repellent and insalubrious to the constitution of the tree, which, together with the strong surface-growth, hastened to destroy the vegetal vitality of the tree.

(*b*) Another portion was planted with trees of the same age, but on this part the grass was kept short around the plants which required much care—an amount of labour and extra expense; but over all, the ratio of deaths was nominally small.

(*c*) Another portion was planted with robust, well-rooted, vigorous trees about twenty inches high, and these too, similar to the first, were left without further notice and did excellently; indeed, so well, that the number of deaths which did occur were so few that it was not considered requisite to make up.

I do not argue against paring as being pernicious to tree growth, nor deleterious to the future existence of the plant; but I contend it is not required to ensure tree growth, and that grassy land can be successfully planted without having to apply any conjoint or precedent operation, and that it does not yield results adequate to the enhanced outlay.

Like 'Bannockburn,' I too have found grassy and other vegetation very serviceable, not only in protecting trees the first year after planting, but in defending them against the extremes of local climate for the first few years.

In Ireland, a system of planting I have seen in practice is to skin the surface with a broad-ended pick, and with the opposite end slacken the soil of the place so skinned—making in that way an unopened sort of pit. The method is good, seeing it is much more economical than the more general method practised in England of open pits, and the Irish usage is altogether as certain as the English. Still, after all due care in the way mentioned, I have seen the weedy vegetation of one kind or other so inordinate that it employed a few men during some months in summer to keep it in check; for, *naturam expellas furcâ, tamen usque recurret;* but otherwise deaths would have been excessive, not so much for lack of moisture as for want of sufficient sunlight and air.

In some instances, however, much care may be adopted in planting, it is often pregnant of much extra work, for neither paring nor pitting is of itself enough to insure the success of the tree against the tendency of some soils to produce injurious weedy herbage.

What does Mr. D. F. Mackenzie mean by the following, at p. 376 of last number?—'In practice I found that, when the grassy turf was pared off, the roots of the plants were better protected, and in making the notch the soil was made friable . . . neither did the plant suffer so readily by being blown about as when notched in the grassy turf.

Does Mr. Mackenzie own that plant-roots are better protected with the turf removed than when left intact? or that the soil is made friable instantaneously with the paring of the turf? or that the plant suffers less from being blown about? If such be his meaning, even at the risk of calling down the vengeance of such an entity, such a practical, well-known, and tried forester; yes, at any risk—from his opinion I altogether differ, and consider his tuition not only deceptive, but absurd and opposed to the fact. Again, how criticism can injure 'FORESTRY,' or aught written therein, is not apparent. But if criticism harm anything, it must be the chartalan, the egotist, his *amour-propre,* or his prittle-prattle. Criticism is invigorating and wholesome, seeing that its object is to deprecate and expose counterfeit articles. However, there are certain persons who would parade their own doctrine as the only true and absolute doctrine, and the humble lay members outside the arena of this infallible and all-wise clique, who cannot swallow all the spurious pills of their manufacture without protest, are doomed to eternal isolation and the confederated scorn of the sylvan gods.

Last time I wrote under the assumed name of 'Sylvestris,' and for fear of again provoking the ire of Mr. Mackenzie this time I subscribe my own name.

Glendye. JAMES FARQUHARSON.

SIR,—I, at least, as one of the readers of 'FORESTRY,' find but little difficulty in forming an opinion as to which side the 'preponderance of reason and argument lies' in the 'thrashing-out' process of the above subject; and although enough, and perhaps more than enough, has already been written on this very significant matter, you, will perhaps grant me your kind indulgence and space enough to add my item of experience; for when such as 'Bannockburn' write on important subjects such as the above, it makes one pause and think over all they have done and seen.

To pare very grassy surfaces for ordinary plants, when pitting is not necessary, is so uniform a practice *North* and *South* that it almost seems too simple to have been mentioned by Mr. Scott in his monthly article on 'Forest Work'; but when such articles are meant for the instruction of the young and as a reminder to the old forester, it is quite in place. That it is proper to criticise such articles is very questionable etiquette; and I think, with Mr. McKenzie, that if it is done, such writers should be as manly as to also subscribe their name and address.

A practical forester 'Bannockburn' cannot be, or else his practice is very limited indeed. How can he explain the following quotation from his own letter, which appeared in your issue of last month (p. 377):—'No one will dispute the practicability of paring, provided the initial cost of planting is not considered; but as to the necessity or utility of it, I entirely demur'?

I think you will agree with me when I say that it does not take any great amount of observation to see that he makes the one part of his sentence upset the other, for what is *practical* is surely *necessary.** As to the question of initial cost cropping up at this stage, when after-success is at stake, it is altogether absurd; and if your correspondent can only support his theory from a pounds, shillings, and pence point of view, he had better have left the subject untouched.

The mere fact of his admitting that he did not think that any herbage (bracken excepted) growing at an elevation of from 500 to 1,500 feet can prejudicially affect newly-planted trees, is sufficient to show that he has but a very indifferent acquaintance with the subject he has brought before your readers.

I had for some time the management of an estate in the south of Scotland, where, some time previous to my being there, a piece of rough moorland, of an elevation of some 500 feet, had been enclosed, thoroughly drained, and planted up, and which for three successive years required to be 'beat up' with plants at the rate of not less than 1,500 plants to the imperial acre, notwithstanding that the grass and other herbage were regularly cut down; and when I took the plantation in hand, I had, to make a long story short, to replant the whole enclosure. In the process of doing so I took the (necessary) precaution of paring the turf before notching, and I have now the satisfaction of knowing that my work has been fairly successful. Perhaps your correspondent will say that in this case there was no *necessity* or *utility* (or profit) in paring the turf. Friability of the soil is a necessary condition for the success of the young plants, and with a *tough, matted* turf that condition is impossible unless pitting is resorted to. Paring should be done to prevent, first, the plants from being killed by very dry weather, and to avoid the expensive and, I would say, the impracticable method of cutting the grass at least twice during the first season; and, second, to admit of proportionally small plants being used.

Generally speaking, the space so pared will have a thin coating of grass before the first winter; and, if this was not the case, would the plants be worse off than if in the bare ground in the nursery? No one would think of sowing grass amongst nursery stock to keep the roots moist and warm. I hope 'Bannockburn' will see this side of the question, as in my opinion, and nearly all who have studied plant life, the more friable the soil is at the roots of the plants the more vigorous the growth, and proportionally less will be the death-rate.

Kennet, Alloa, N.B. J. T. M'LAREN.

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* Our correspondent Mr. M'LAREN appears to overlook the important distinction between the words *practical* and practic*able.*—ED.

TREE PLANTING.

SIR,—'Bannockburn' evidently fails to understand what is meant by the expression, '*a close, grassy vegetation*,' and in his dilemma appears, from the tenor of his last letter, to be somewhat out of temper; which may arise from the fact that as yet he finds his opinions are unsupported. With something like a sneer he would have your readers believe that paring is only practised by a few foresters in the North. Sneers, I hope, we can afford to disregard; and I would remind him that, although he could prove such to be the case, it would not by any means detract from its merits. I venture, however, to give it as my opinion, that it is, if not practised, at least approved of beyond the confines of the North; and that it is so is substantiated by Mr. McKenzie's letter in your last issue.

'Bannockburn' has apparently been unfortunate in his paring experience, and the very mention of it seems to recall to his memory unpleasant recollections. And why so? Simply because he has been paring where it was not required. He has evidently adopted it in every conceivable soil and situation but that in which it was required. He styles it an 'innovation,' yet it appears to be no new thing in his experience, neither is it of very recent origin in mine. Although I recommend it, and adopt it, and find it to be greatly to the advantage of all concerned, except the nurserymen, to do so, yet I would never think of doing so indiscriminately, as 'Bannockburn' seems to have done. The judicious performance of it is, in my opinion, highly beneficial; the abuse of it results in needless expense and it may be failure. Mr. McKenzie, in a very practical and common-sense letter, stated very clearly a case in point, and also 'Tamas'—whose remarks with reference to the Culbin Sands I can corroborate. I could also state several others, some from want of moisture—and this can only be obviated by paring—others from suffocation, and in some cases perhaps from both. I do not, however, deem it necessary to enter further into the merits of this discussion, as, after what I have already stated, and the clear cases cited by your correspondents referred to, in support of my recommendation, your readers will be quite able to understand what is meant by the expression, '*a close, grassy vegetation*;' and I venture to think 'Bannockburn's' anonymous endeavour to construe a plain specific statement into one of a general character will not meet with general approval.

Darnaway, N.B. D. SCOTT.

FORESTERS AND THE INTERNATIONAL FORESTRY EXHIBITION.

SIR,—On looking over the 'Editorial Notes' of 'FORESTRY' for March, I find it stated that, 'It is a remarkable fact that foresters are exhibiting an unaccountable amount of diffidence in entering into the spirit of the forthcoming Exhibition.'

This is a very important keynote to the subject in hand, and it may well be doubted if foresters are responsible for the uncertain sound which has been given forth in regard to this matter. I, for one, do not think so. It must be remembered that foresters are not landed proprietors. They are only servants to their masters, and unless their masters will it, it is easy to understand that foresters of themselves can only make a very small move in the matter. It is comparatively easy to promise £50 or £100, as the case may be, to aid in a guarantee fund; but unless there are willing heads and hands it will be only an abortive effort after all, and the guarantee fund will go for nothing. However, it is to be hoped that any apparent indifference on the part of landed proprietors and their foresters will yet be made up for by a mutual approach towards each other, and that my lord will be heard to say to his forester some of these fine mornings, 'John, are you having anything looked out for this great International Exhibition, because I want to do all in my power to make it a success. I have already promised £100 to aid in a guarantee fund; but, John, do you not think it would be well to put the £100 to some use in the way of bringing some things of practical interest on this estate before the notice of the public—thus making the whole affair a success, and doing away with the possibility of any need of a guarantee fund?' No doubt John will be heard to say, 'You are quite right, my lord. I was always thinking of saying something to your lordship about it, but I was aye waiting to hear what you would say yoursel'. There's no muckle time to put off, and whatever is to be done must be done at once.'

Now, I believe that this, in most cases, is the true solution of the apparent indifference of foresters in connection with the forthcoming Exhibition; and if proprietors would take a practical interest in the matter, I am perfectly certain that foresters as a body will not be found wanting. It is not yet too late, and I think if Mr. Cadell, the secretary to the Exhibition Committee, were instructed to forward circulars to all landed proprietors and their estate managers, asking them to do all in their power in the way of bringing forward whatever may be of practical value and interest to the forthcoming Exhibition, there would be a willing response.

Another thing: I hope when the time comes that foresters will be allowed at least a week's holiday, and the wherewithal to pay their expenses during their brief sojourn, and thus

> 'By mutual effort and by mutual aid,
> Great deeds be done and great discoveries made.'

WAIRDS.

[Our correspondent touches upon a point connected with the International Forestry Exhibition, on which he will receive the sympathy of every one interested in British foresters and forestry. The initiation of such matters naturally rests with the forester's employer; and in the ordinary course of things, the employer will direct his forester as to what he wishes to do in contributing to the Exhibition. In these days, however, many landowners are otherwise so much engaged, that they may overlook such a matter, and trust to their agents, or the foresters, to see that the estate is fairly represented at the Exhibition. In such cases, and we know they are numerous, it is the *duty* of the forester to bring the subject under the notice of his employer, and to explain it as clearly as possible, so that there may be no misunderstanding afterwards. The result will be almost invariably in favour of the forester doing his best to send a fair sample of the forest products of the estate to the Exhibition.

We believe we are correct in stating that every owner of woodlands of any extent in the United Kingdom has had copies of the Exhibition Circulars sent to him, so that they all know about the Exhibition; and where they are not moving in the matter, foresters should bestir themselves, and learn without delay the views and wishes of their employers. They should not be 'always thinking of saying something,' but should *say it* straight out, and we dare say that then in most instances all that our correspondent desires will be promptly andfreely accorded.—ED.]

A NEW DENDROMETER.

SIR,—In reply to 'Ratho' (page 384, last issue), I cannot tell why no more has been heard of the dendrometer for which I got the first silver medal at the General Meeting, of the Scottish Arboricultural Society, in October last. I can only assume that none of the reporters thought it worthy of any further notice. In this assumption I think I am correct, as Mr. Rider, of 'FORESTRY,' was at the meeting; and I have no doubt whatever, that had the instrument been considered worthy of notice a notice would have been given. The instrument had the disadvantage of being badly made, as 'Ratho' says, but that did not interfere with the application of the principle and though myself and a number of others think the instrument one of the best yet invented, I do not think it would do me much credit to 'toot my ain horn,' even to the advantage of 'Ratho' or any others who may wish to know all about the dendrometer through the public prints; and it must lie in oblivion till it can raise itself by a good name, should it be fortunate enough to procure such. I may, however, be permitted to tell 'Ratho' that the instrument does its work, as was shown in the drawings he referred to. It will take the height or length of any object, from any position, whether from forty degrees below, or the same above, the level of the object, and whether erect or leaning. It will also find the distance to the object, if required. It only requires one to work it; it requires no calculations, as it indicates feet, yards, chains, and miles in plain figures. It will take levels, measure angles, and can be used in the field by the army as a range finder and clinometer, and for field use: it is said to be superior to Watkins's range finder and clinometer, two separate instruments by that maker.

On the advice of practical mathematicians, the instrument is to be patented. As yet I cannot state the cost, as much will depend on circumstances; but I do not think it will exceed 35s. As to its being new, I can only hope it is, as it has so entirely outgrown itself during the six years it has been in progress, that nothing but the principle remains. The root of the principle is not new, as it is found in 'Euclid;' but the application of the principle is quite new, and was for the first time (so far as is known) applied by Mr. Forbes, teacher, Clava Public School, Inverness-shire, in 1877–8, to whom belongs the honour of originally inventing the mode of application of the rule. This notice I consider due to the gentleman referred to, for his courtesy to me in the matter. The improvement and additions to its uses only belong to me as my share of the invention.

D. F. MACKENZIE.

Morton Hall, Edinburgh.

PINUS AUSTRIACA.

SIR,—Since my remarks on the failure of some Pines of this variety, which appeared in your December number, I have observed no allusion to the subject except that of Mr. Cannon's, in your February issue, and he writes from Salbris, in France.

He describes the particular district as mostly dry sand, and very acid and more or less heathy, with an elevation of about 400 feet, and nearly flat. He ascribes the failure of the Austrian Pine there to the absence of lime, and he asks me to state where I have found them succeed and where to fall away.

Referring to my previous remarks, it was there stated that where they had failed was at an elevation of 1,000 feet. By a printer's error 'adjoining *woodlands*' was put instead of '*moorland*,' which makes all the difference, for there is no sort of shelter. The range of moorland referred to is that dividing Yorkshire from Lancashire, which forms the backbone of England and divides the watershed of the east and west coasts. The millstone grit is the well-known rock of the district, and there is no lime in the soil.

If I were to state where I have found it succeed, I should have to quote every variety of soil and all parts of England. Mr. Cannon's experience in one of the poorest districts of France is, I fear, no sufficient guide to planters in England.

The subtle distinction of climate is almost beyond the power of classification. The Austrian Pine has not been tried in England half a century, and it is therefore most important to learn how far it appears to suit our climate. My own observation, as I have said, in all parts of England, led me to the conclusion that in every variety of soil it was a most reliable grower. I have met with no failure, and I therefore thought this instance, at such an unusual elevation, worth recording. Growing admirably for eighteen years, I think we may conclude that the soil was not unsuitable in this instance, and that to the cruel frosts and winds occurring at a special stage of its growth the evil result was due.

In a part of the old forest of Sherwood, in Notts, growing only heather, and consisting of sand of the poorest description, I have lately advised the planting of Austrian as well as Scotch Pines. In such an arid soil, of course, a great deal depends upon the first spring. A long drought with cutting winds will cause a struggle for existence with every plant, whilst a good amount of rain in April will afford them a fair chance. In such situations the plants can hardly be too small, if well-rooted and twice transplanted in the nursery. Where the subsoil is hard, a pick should be driven in to loosen it round the plant without turning it up. I have found the Austrian answer quite as well as the Scotch Pine in such soils, while they are not averse to retentive soils with a considerable amount of moisture.

In your January number a contributor gives a testimony to their adaptability for transplantation. This affords an additional proof of their being suitable to our climate. Lord Manners has some magnificent specimens of the *Austriaca* and *Laricio* at Thoresby, but I think the former the grander species in every respect. In Devonshire, on Mr. Rolle's estate, that comparatively mild climate seems equally to agree with it, and both on strong and light soils none of the coniferæ appear more flourishing.

W. LIPSCOMB.

Heath, Wakefield.

THE FORMATION OF DEW.

Sir,—In your last issue (p. 360) Mr. David Cannon talks of dew being intercepted by trees, grasses, &c., before it can fall to the ground; and this naturally suggests the question, How and where is it formed in the air so as to fall to the ground?

I have been told that on light, sandy soils covered with a crop of good grass, on a clear, still night, the grass may be quite wet with dew in the morning; and that at the same time a fallow field of the same soil adjoining it may be without a particle of dew having fallen upon it.

I am also told that everything may be in favour of a heavy fall of dew in the evening, and yet, if a severe gale of wind sets in and blows all night, there may be no dew in the morning in either the supposed grass or fallow fields.

Perhaps Mr. David Cannon, or some one of your numerous readers, will be so good as to explain these phenomena.

Dunrobin, Golspie, N.B. D. M'Corquodale.

[Dew is simply the deposition, in liquid form, of the moisture in the air. Blades of grass radiate, or give off, their heat more quickly than earth, and hence moisture is more readily deposited upon them than upon the ground in a fallow field. The absence of dew on a windy night is occasioned by the dissipation by the wind of the atmospheric moisture.—Ed.]

RE-PLANTING.

Sir,—Would you favour Lord Castletown with your advice, on cutting a Scot's Fir wood, and replanting the ground with another crop of the same kind? The wood has been planted about thirty-five years, and it is now fit to be cut over and disposed of. The land is principally bog. Would you advise planting next season, or letting it rest, say, for three years before planting? Lord Castletown will feel grateful for any remarks you may make on the subject.

Lisduff, Queen's County. Samuel Brady.

[As soon as the crop is cut down and removed from the ground, including all that may be useful for fuel, let the ground be carefully gone over and cleared of twigs, chips, bark, and any other woody matter. Collect these into heaps with a rake, where the nature of the herbage will permit the use of it, and burn every morsel of them; taking care not to set the bog on fire, if it is in a dry state. Clean out the drains, and cut fresh ones where they are required, spreading the cast-out moss over the ground. If the land was well-drained for the former crop, and is now in a fairly dry condition, planting may take place next season; but if the bog or moss is in any degree waterlogged, the planting should not be done for two or three years, until the sour water has had time to drain off. Should the district be infested with the Fir Weevil, *Hylobius abietis*, proper precautions should be taken against its attack. Details of the most effective means used in warding off the attacks of the Weevil will be found in former volumes of the 'JOURNAL OF FORESTRY.' The method so successfully followed by Mr. M'Corquodale, the eminent forester to the Earl of Mansfield, at Scone, Perthshire, is particularly worthy of attention, as being simple and effective. It consists in smoothing the surface of the soil with the back of the spade around the newly planted tree as the work proceeds, and thus leaving no crevices for the Weevils to shelter in during the day, when they usually lie dormant. If the land is pure bog, consisting wholly of organic matter, the best trees to plant it with are Scot's Fir and Birch. Should there be more or less of an admixture of inorganic matter, or the bog is not more than three feet deep, then Poplars, Willows, Alder, Spruce, Silver and Hemlock Firs, may be planted with advantage.—ED.]

LARGE TREE AT DARNAWAY.

SIR,—In 'FORESTRY' for March, 1884, Mr. D. Scott gives the measurement of this Spanish Chestnut at 525 cub. feet, and the report of the Scottish Arboricultural Society at 400 feet, a difference of 125 feet. Which is right? I presume it will hardly be contended that the tree in question increased so much since 1881?

JOHN SMITH.

Romsey, Hants.

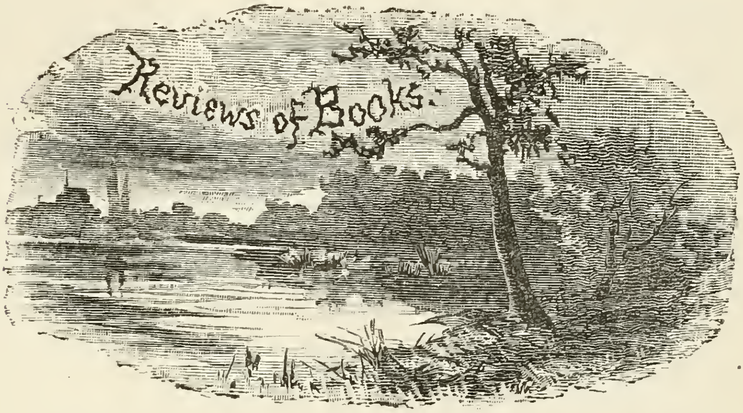
LARGE OAKS.

SIR,—In the communication on this subject by 'C. R. W.,' in the January issue, pp. 188–189 of 'FORESTRY,' he gives dimensions only. Can he give the age of the Oak, or an approximation of it? As my forefathers were from Merionethshire, I look in that direction with interest, which must be my apology for troubling you.

Yours truly,

ROBERT W. FURNAS.

Evergreen Home, Brownville, Nebraska.


Reviews of Books.

Sketches of Bird Life, from Twenty Years' Observation of Their Haunts and Habits. By JAMES EDMUND HARTING, Author of 'A Handbook of British Birds,' &c. London: W. H. Allen and Co.

THESE sketches, the author assures us, have all been written from his personal observation, during many years, of birds in their natural haunts. His descriptions are embellished by the drawings of Mr. Charles Whymper, and the two have produced a most charming volume. We have delightful chapters on the kestrel, the short-eared owl, the thrush, the blackbird, the fieldfare, the robin, the nightingale, the blackcap, the garden warbler, the whitethroat, the several species of titmouse, the golden-crested wren, the siskin, the brambling, the chaffinch and goldfinch and bullfinch, the sparrow, the jay, the cuckoo, the hoopoe, the plover, the lapwing, the woodcock, the ruff and reeve, the curlew, the heron, the teal, and the herring gull.

Who that loves the country ever tires of country subjects? and what more congenial subject for pleasant gossip can there be than the birds? 'No matter what the time of year or place in which we take a country ramble,' says the author, 'some feathered favourite, we may be sure, will greet us with welcome note, or arrest our attention by some peculiarity of habit.'

We cannot speak too highly of Mr. Whymper's delightful sketches, charmingly produced, and admirably printed; and we should like, did space permit, to take many extracts from the interesting text of Mr. Harting, but we must be content with one. Touching current opinions as to the laying of the cuckoo, the author says:—

'What really takes place, we believe, is this: The cuckoo lays her egg upon the ground. The colour of the egg is variable, according to the condition of the ovary, which depends upon the age of the bird, the nature of its food, and state of health at the time of oviposition. With her egg in her bill, the bird then seeks a nest wherein to place it. We are not unwilling to accept the suggestion that, being cognizant of colour, she prefers a nest which contains eggs similar to her own in order that the latter may be less easily discovered by the foster parents. At the same time, we so frequently find the egg in question amongst others which differ totally from it in colour, that we cannot think the cuckoo is so particular in her choice as Dr. Baldamus and the supporters of his theory would have us believe. A friend of Gilbert White found upon trial that the note of the cuckoo varies in different individuals. About Selborne Wood he found they were mostly in D. He heard two sing together, the one in D, the other in D sharp, which made a very disagreeable duet. He afterwards heard one in D sharp: and about Wolmer Forest, some in C. Gungl, in his "Cuckoo Galop," gives the note of the cuckoo as B natural and G sharp. Dr. Arne, in his music to the cuckoo's song in "Love's Labour's Lost," gives it as C natural and G.'

We give our cordial approval to Mr. Harting's delightful book.

America Revisited: from the Bay of New York to the Gulf of Mexico' and from Lake Michigan to the Pacific. By GEORGE AUGUSTUS SALA, author of 'A Journey due North,' 'Paris Herself Again,' 'America in the Midst of War,' &c. Illustrated by nearly 400 engravings. Fourth edition. London: Vizetelly & Co. 1883.

MR. SALA is such a literary veteran, and his writings are so widely known, that any discussion of their character and merits would be entirely a work of supererogation. All, therefore, that the reviewer would be expected to do would be to call attention in the case of a new book of his to the particular direction in which his fertile and facile pen had been engaged, for it would be strange indeed if any production of his were found other than interesting and amusing.

In the bulky and profusely illustrated volume before us we find, as we had fully expected, a vast store of interest and amusement. The illustrations, indeed, are so copious that they furnish a narrative, so to speak, by themselves; and the mere lover of pictures would find enough to interest and instruct him without the lively and elucidating text of the clever *littérateur*. From amusing sketches of the outward journey, we pass to the wonders of New York. From thence to Baltimore, Philadelphia and Richmond, Augusta, Atlanta, New Orleans, Omaha, El Dorado, China Town, Salt Lake City, and Chicago, we are glidingly transported, through chapters of delightful gossip, narrative, incident, and description. To attempt an adequate review of a book like this within a moderate compass would be to attempt an impossi-

IN THE SOUTH. *From 'America Revisited.'*

bility; for though we extracted a hundred interesting bits, we should still have to leave even unrepresented a large amount of interesting matter.

Our author is, of course, always happiest when in cities and amongst men, for busy life gives the best opportunity for the display of his especial genius. Yet he has a keen eye for the beauty of scenery; and when he gets away from the region of the town, he gives us enticing glimpses of the country, and some very choice illustrations. Two of these we reproduce by the courtesy of the publishers. He is, for instance, in the South, and he says: 'When the darkness of the night gave way to a most glorious sunrise, I found, looking from the outside platform of the car, on which nobody is allowed to stand, and where everybody persists from time to time in standing, that the whole aspect of the landscape had been transformed, and that I was indeed in the South. Wherever the eye turned, the horizon was closed by mantling forests of Pine. The balsamic odour of the Palm tree was wafted to you as the train glided along; some arboretic kindred beautiful feathery tree, which has given to South Carolina her proud sobriquet of the "Palmetto State," began to assert itself; and Water Oak and Aspen, Gum and Cedar, Black Walnut and Persimmon, Hickory and Maple, with a host more trees than my scant sylvan vocabulary can enumerate, made the land glorious.'

We would fain quote, did space permit, our author's sketch of Oakland, where 'geraniums, roses, fuchsias, callas, verbenas, and some tropical plants and flowers grow luxuriantly all the year round, never suffering from outdoor winter exposure,' and where 'fruit trees develop into bearing within a third or at the most half the time required on the Atlantic coast'; but we must be content to reproduce a little 'bit' of Oakland scenery by giving the pretty engraving of Lake Merritt. Finally, let us say that this admirably illustrated work is in all ways interesting and clever.

Glossary of Terms and Phrases. Edited by the Rev. H. PERCY SMITH, M.A., of Balliol College, Oxford, Chaplain of Christ Church, Cannes. London: Kegan Paul, Trench and Co.

A DISTINCT want is admirably met in this well-printed and substantial volume. Its aim is 'to bring together such words, expressions, quotations, &c., English or other, as are among the more uncommon in current literature, and require, not for the scientific but for the ordinary reader, explanations for the want of which the meaning of a sentence or a paragraph, even the drift of an argument, is often missed; explanations, moreover, not to be obtained without reference to, and perhaps tedious search among, a large and varied number of books, many of them not easily accessible.' The editor trusts that this glossary may supply all the information needed by general readers who may wish to have a fair understanding of the text of any work in ordinary English literature. Of the terms and expressions used some, he adds, are more or less technical and scientific; some are simply uncommon; some contain allusions mythological, historical, geographical; some fall under a very large class which must be styled miscellaneous, and some belong to other languages than our own. In explaining words no attempt has been made to enter further than is necessary into the nature of the things named. The plan, in fact, is as follows:—Words are omitted (1) of whose

LAKE MERRITT, OAKLAND. *From "America Revisited."*

actual signification there is no doubt, this book being a glossary, and not a miniature encyclopædia; (2) which imply a special knowledge of the art or science to which they belong; (3) which, occurring in writers such as Spencer, Burns, &c., are explained in glossaries attached to them. It is somewhat difficult, of course, as the editor explains, to define the exact limits of an ordinary reader's needs; but he certainly has succeeded in producing a most useful and valuable book. Let us take an instance or two at random. '*Faggot votes:* votes obtained by splitting up a property into a number of small holdings just large enough to confer the qualification.' There is a further sentence as to the morality of certain manufacturers of faggot votes, but the one we have quoted is an instance of good definition. '*Forest courts:* old courts for governing the royal forests. They were: *Woodmote*, held by verderers every forty days to try offences against vert or venison; *Court of regard*, every third year, for expeditation of mastiffs; *Sweinmote*, thrice a year, before the verderers and a jury of sweins (freeholders); *Justice seat*, before the justice in eyre.' *Agnosticism* is defined as 'the theory that man has insufficient evidence or insufficient power for judgment concerning Divine truth.' These are but atoms from a great mass of definitions, but they will illustrate the aim and method of the book.

The Chronicles of Newgate. By ARTHUR GRIFFITHS, Major late 63rd Regiment; one of Her Majesty's Inspectors of Prisons; Author of 'The Memorials of Millbank,' &c. New edition. London: Chapman and Hall (Limited). 1884.

A FULL history of Newgate would be, as Major Griffiths remarks, an epitome of the criminal history of England. It would be most voluminous, and many portions of it would be wearisome to the reader. Still there is a vast amount of matter in the archives of this remarkable institution which, though painful, is most interesting and instructive, and the collection of which would prove most useful to the student of society. The author, therefore, though feeling embarrassed by the immense amount of his material, has laboured hard to give the more prominent and representative cases, and he has certainly succeeded in making a most valuable collection. His book is a bulky one of about 600 pages, which include chapters on mediæval Newgate, Newgate in the sixteenth century, Newgate in the seventeenth century (down to the Great Fire), the press yard, executions, escapes, the gaol calendar, the gaol fever, the new gaol, crimes and criminals, Newgate down to 1818, philanthropy in Newgate, the beginnings of prison reform, the first report of the inspection of prisons, Newgate notorieties, later records, and Newgate reformed.

There are a number of illustrations representing methods of punishment and torture, prison interiors and exteriors, and famous criminals. The book is a notable one; it is cleverly and interestingly written, and will supply a place in the library not filled by any other work with which we are acquainted.

The Forest Flora of South Australia. By J. E. BROWN, F.L.S., Conservator of Forests for the Government of South Australia. Printed by E. Spiller, Government printer, Adelaide. Part III.

THE part which has just reached us is a substantial instalment of Mr. Brown's magnificent work. It contains coloured plates and letterpress descriptions of the following:—*Acacia pycnantha*, the broad-leaved Wattle; *Eucalyptus corynocalyx*, the Sugar Gum; *Cosuarina distyla*, the Scrub She-oak (male plant); *Casuarina distyla* (female plant); and *Eucalyptus capitellata*, the Head-flowered Stringybark. In these five magnificent plates, which measure, as does the whole work, 21 inches by 17 inches, we have not only nature prints of the leaves, stems, and flowers, but of the fruit and wood, and of botanical parts. We trust that the author is repaid for the great outlay which the production of this book must necessitate. When finished it will, we think, make the grandest 'tree book' in existence. We heartily wish it all success. The descriptions which accompany the plates are all that can be desired, and the type is bold and excellent.

The Haunted Homes and Family Traditions of Great Britain. By JOHN H. INGRAM. London: W. H. Allen and Co., 13, Waterloo Place. 1884.

HERE is another collection which must have cost the author an immense amount of careful and laborious work. It is intended as 'a guide to the geography of Ghostland,' a handbook to the haunted houses of Great Britain. 'Many historic tales of apparitions and supernaturally disturbed dwellings,' says the author, 'are imbedded in British literature, are frequently alluded to in journalistic and other publications, and are known to everybody by name, but by name only. Most people have heard of "The Demon of Tadworth," the Lord Lyttleton ghost story, and other celebrated narratives of the uncanny kind, but it is rare to find any one able to furnish particulars of them.' And to enable them to do this is the *raison d'être* of the work before us. The book takes a considerable range, and the extent of its references to ghostland may be recognised by readers wide apart by the list of places that have been more or less 'haunted.' These include Allanbank, Bair Hall, Barby, Beaminster School, Bisham Abbey, Botathen, Bowood, Bristol—the Vicarage—

Cambridge, Cambridge University, Canterbury, Cawood Castle, Chedworth, Cheshunt, Corby Castle, Cortachy Castle, Creslow Manor House, Daintree, Dunfermline, Edge Hill, Edinburgh—Canongate—Gillespie Hospital, Trinity—Enfield Chace, Epsom—Pitt Place—Epworth Parsonage, Esher, Eton, Glamis Castle, Glasgow ('The Hell Club'), Grayrigg Hall, Hackwood House, Hanley, Heanor, Hereford, Henhow Cottage, Hilton Castle, Holland House, Lambton Castle, Littlecot House, London—Argyle Rooms, Broad Street, James Street, W.C., St. James's Palace, St. James's Street, The Tower—Lowther Hall, Lumley, Mannington Hall, Milford Haven, Nannau, Newstead Abbey, North Shields—Stevenson Street—Ottery, Oulton High House, Oxford University—Queen's College—Peele Castle, Plymouth, Powis Castle, Rainham, Ramhurst Manor House, Rochester, Rushen Castle, Sarratt, Scorrier House, Settle, Souldern Rectory, Spedlin's Tower, Strachur Manse, Taunton, Tedworth, Truro, Waltham, Warblington Parsonage, Westminster—King Street—Willington Mill, Windsor Castle, Woodhouslee, and Yorkshire. There is also an appendix of miscellaneous information. In a very emphatic sense these stories are thrilling, and the book is sure to find a host of enthralled readers.

The Sea-Fisherman: comprising the Chief Methods of Hook and Line Fishing in the British and other Seas, and remarks on Nets, Boats, and Boating. By J. C. WILCOCKS. London: Longmans, Green, and Co. 1884. Fourth edition.

THE author of this excellent and valuable book was the winner of the prize of £100 at the International Fisheries Exhibition of 1883, for the best essay on improved fishery harbour accommodation for Great Britain and Ireland, and he is the author also of six other prize essays on fishery subjects at the Fisheries Exhibition at Norwich in 1881, and at Edinburgh in 1882. He is, therefore, it must be admitted, a competent authority on the subject with which this volume deals. The present edition is much enlarged from the previous one, and is almost entirely re-written. It is profusely illustrated with woodcuts of leads, baited hooks, knots, nets, boats, &c., and detailed descriptions of the same. We have often wondered that such a book as this has not been forthcoming before, because there is a very large public interested in sea fishing, not merely as consumers of sea fish, but as lovers of sea angling. Yet hitherto, although the demand for books on fresh-water fishing have been abundantly met, there has been a positive dearth of volumes on the subject now most exhaustively dealt with by Mr. Wilcocks. The author is right in his belief 'that amongst all the useful arts there is probably not one of which the knowledge has been so much confined to those who make it thei vocation as sea fishing.' Hence there is an additional reason for the publication of 'The Sea-Fisherman.' We give our hearty testimony to the fact that this work is overflowing with information most usefully supplemented by illustrations, and we feel sure it must continue to secure a large sale.

Easy Lessons in Light. By Mrs. W. AWDRY. *Easy Lessons in Heat.* By C. A. MARTINEAU. London: Macmillan and Co.

BOTH of these excellent little books are illustrated by diagrams. The first on light gives chapters on refraction, reflection, on the undulatory theory, on measurings, on diffraction, on the spectrum, and on the rainbow. The one on heat discusses the expansive powers of heat, temperatures, the spreading of heat in solids, ventilation, winds, viscosity, freezing, latent heat, gas and vapour, freezing mixtures, evaporation, boiling, geysers, vegetation, glaciers, and the thousand and one subjects that bear directly or indirectly upon heat or its absence. Nothing is healthier and better in the educational literature of the day than the tendency to popularize the treatment of scientific subjects, and the necessary cheapening of books which follows their popularization. Books of the kind we refer to, like the two before us, can be put in the pocket, and thus may afford instruction during the course of a railway journey of only a few moments, and in time that is too frequently altogether wasted. They deserve a large sale and every encouragement from those they are intended to reach and to benefit.

Enquire Within upon Everything. Sixty-eighth edition, carefully revised. London: Houlston and Sons, 1884.

THE fact that nine hundred and seven thousand copies of this well-known book have been printed, is a sufficient proof of its immense popularity. The notification, therefore, of a new edition will probably be the occasion of a still larger demand for it, for there are, of course, yet to be found people who have not the book in their possession, although it would doubtless be difficult to find one person who has never seen it. Besides the careful revision, which the present new edition has undergone, many additions have been made to the work, and the classification of subjects has been improved in accordance with many suggestions, Since its first publication the field of all 'enquiry' has of course grown, and the editor has endeavoured to keep pace with this growth. The volume, though moderate in size, .contains 388 closely printed pages, besides an index of 28 pages. Certainly this is a book that no one should be without.

Where Shall I Educate My Son? A manual for parents of moderate means. By CHARLES EYRE PASCOE. London: Houlston and Sons. 1884.

HERE is another indispensable book. It is an answer to a question that the author and many other persons have frequently asked; and it is answered in the following chapters:—1. 'The greater opportunities of the greater public schools.' 2. 'The lesser opportunities in the other public schools.' 3. 'Yearly expenses in the average middle-class schools.' 4. 'Free education and maintenance.' 5. 'Special aid in special cases.' 6. 'Alphabetical list of endowed grammar, country and proprietary schools whose fees (for tuition alone) do not exceed £20 per annum.' There is an appendix of examination papers set for election to Winchester College, and Harrow and Rugby schools, and it will be thus seen from the preceding enumeration of contents that the little volume is a most useful and essential hand-book and a guide which thousands of parents are constantly needing to the means of providing for the educational necessities of their families.

Lays of Ancient Rome, with Ivry and the Armada. By Lord MACAULAY. London: Longmans, Green, and Co. 1884.

THE new edition of this English classic sent us by Messrs. Longmans contains explanatory notes, and is issued at the price of one shilling. It is capitally printed and neatly bound, and should be bought largely by parents to give to their children. In the whole English language there scarcely exists a finer composition than 'Horatius.' Every boy ought to learn it by hert, and the effect of this cheap re-issue of the stirring poetry of one of the greatest of England's sons ought to lead to its wide dissemination in every class and grade of society.

Sell's Dictionary of the World's Press. London: Henry Sell, Fleet Street, 1884.

THIS is a remarkable shilling's worth, and a most valuable and useful book. It is a thick volume, well and strongly bound, and contains no less than four coloured maps. Information is elaborately afforded concerning all newspapers and magazines published in the British Islands. There is also a list of all the principal foreign newspapers, and, in addition, there are most useful chapters on advertising; how, when, and where to advertise; on the law concerning newspaper libels, &c., &c. It is certainly the cheapest and best shilling's worth we have seen for a very long time.

Manuel du Cultivateur de Pins en Sologne. Par DAVID CANNON, Laureat du Prix d'Honneur du Comité en 1881. Memoire Couronné par le Comité Central Agricole de la Sologne, Orleans. Imprimerie Pirget, 9, Rue Vielle Poterie. 1883.

THIS excellent and valuable manual on Pine cultivation is from the pen of our esteemed contributor, Mr. David Cannon, of Les Vaux, Salbris, Loir-et-Cher, and won for him a gold medal as the successful competitor in a competition proposed by the Central Agricultural Association of Sologne. The essay was called forth in consequence of the mischief wrought amongst the forests of the Sologne by the severe weather of 1879–80, and the ravages of insects which followed. The object of the papers invited was to elicit, in a plain and easy way, such advice as experience might suggest as to the choice of land, the particular sort of Pines best suited for such lands, and the most desirable methods of culture, as well as to obtain hints as to sowing, planting, clearing, &c., and hints as to the best means of defence against disease, weather, and insects—in short, as to the best methods of forestry that could be pursued. Mr. Cannon has amply and ably furnished the required information in the *brochure* before us. He goes very fully into the whole subject, discussing first, Pines in general, and then proceeding to general considerations on Pine culture, and finally giving us chapters on various descriptions of Pine. We commend a perusal of this excellent treatise (which will be useful to all planters) to the especial attention of those students who contemplate a course of instruction at the Nancy School of Forestry. We shall, perhaps, in future issues, give translations, with the author's permission, of some portions of this little work.

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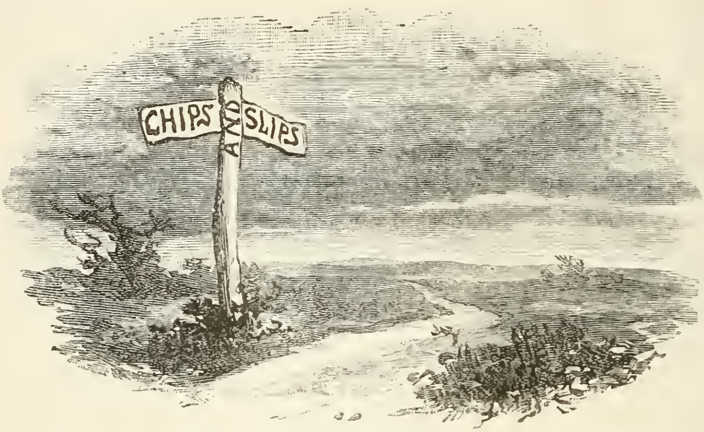
CARRIAGE OF TREES AND SHRUBS.—Having recently received some consignments of trees and shrubs from those excellent and well-known firms, Messrs. Little and Ballantyne, of Carlisle, and Messrs James Dickson and Sons, of the Newton Nurseries, Chester, we were struck by the admirable manner in which the packing was done, and by the excellent condition in which the trees arrived. One tree, a specimen of the Weymouth Pine, 10 feet high, being too large to pack was sent alone, its roots being of course secured, and in that condition it travelled from Chester to London, and was delivered to us perfectly intact and without a branch being broken or injured. We allude to the circumstance to show how great are the facilities for planting, and how easy the process is made by the skill of our nurserymen.

VERY HANDSOME BINDING CASES for Vol. VIII.
are on sale at the Publishing Office, at 1s. 6d., or, 1s. 9d. carriage free.



Professor Balfour.—How many students in successive annual generations have taken their botanical nourishment from Balfour's *Manual* or *Class Book* it would be difficult to say, for though it might be easy for the registrar to give the numbers of those who attended the Professor's classes, first in Glasgow, then in Edinburgh, it would assuredly be a difficult, if not impossible, task to enumerate those who indirectly claim Balfour as their teacher. Writing nearly ten years ago, we said of Balfour that he was a pre-eminently successful teacher—one whose zeal inspires, whose energy maintains, whose lucid style facilitates, the progress of his students. This was written not long before failing health induced the Professor to retire from the more active duties of his office. In our *Edinburgh Supplement*, which was published in September, 1875, we gave a full account of the Botanic Garden then under the directorship of Professor Balfour, and the curatorship of Mr. MacNab. In that account we were naturally led to allude to the work done by the Professor—work which it was evident even then was in excess of his strength. John Hutton Balfour, for long the most prominent member of the medical faculty in the University of Edinburgh, was born in 1808, and in 1845 succeeded Dr. (afterwards Sir William) Hooker in the chair of Botany in Glasgow. He was the friend and associate of Wight, of Falconer, of Dickson, of Greville, and a host of memorable men, most of whom have passed away before him, but who were knit together by the common bond of sympathy in the shape of a love for plants. Their excursions mid moor and mountain were fruitful, as a glance into many a herbarium testifies, and they formed the precursor of that series of herborising expeditions undertaken year by year by the Professor and his students with such zeal and with such advantage to the pupils. In 1845 the Chair of Botany in Edinburgh fell vacant, and Dr. Balfour was appointed to the office and to the Regius-keepership of the Royal Botanic Garden. The Professorship of Medicine was more nominal than real, so far as teaching was concerned; but, as Dean of the Medical Faculty, Balfour was brought into connection with his brother professors and generation after generation of students. His powers of work and organisation and his sympathetic manner contributed largely to the advance that has been made in the progress of the University. Ably seconded by Mr. MacNab and Mr. Sadler, both of whom predeceased him, Dr. Balfour brought the Edinburgh garden to a high standard of perfection, and especially of practical utility. New palm-houses, museums, rockeries, all bear testimony to his zeal. The Edinburgh Botanic Society also profited largely by his example and constant aid. Some few years since, from failing health, Dr. Balfour resigned the active duties of the professorship, being nominated Emeritus Professor. After some time his health improved, so that to some extent his death recently was unexpected.—*Gardeners' Chronicle.*

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